

Dr. Shelly

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JOURNAL OF FARM ECONOMICS

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No. 1

THE FARMERS' INFLUENCE OVER PRICES*

B. H. HIBBARD

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The ability to exercise command over prices is the determining factor in the distribution of goods, whereby one class is enabled to rise to the higher levels of economic well-being; while the inability to command the price situation means eventual loss of such position, or failure ever to attain it. Probably no other class, or group, of people so great in numbers, with so high a level of intelligence, have during the past eventful century and a half remained so passive, and taken its share of the social dividend with such resignation, as have the farmers. Over a large part of this period it is almost as though the farmers' income were predetermined by the fates, and forecast by nothing more modern or reliable than the auguries. This extreme situation is more thoroughly characteristic of America than of some other countries, such for example as Germany, Denmark, and earlier, England.

The American farmer is undoubtedly the most individualistic citizen to be found in numbers in any modern country. His life and his contacts have contributed to the development of a spirit of independence which has long been his pride, and now constitutes his weakness. For more than a century following the Revolution the farmer was coaxed westward by free land, not appreciating that free land

*Read at the annual meeting of the American Farm Economic Association, in joint session with the American Economic Association, Chicago, December 30, 1922.

came near meaning free goods. The American farmer went through a long dreary period of ruinously low prices, after transportation facilities were ample; after cities had grown; after world markets had been brought within reach. Subsequently to the brief period of high prices following the Civil War the returns on farm-grown produce were unprecedentedly low. The explanation of this situation is obvious when seen in the perspective of a generation. It was simply and clearly competition. In proportion to the amount of food needed there was not merely abundance; there was superabundance.

The lure which the farmers followed during the last third of the nineteenth century was not so much that of farm products as it was the farm itself. Every pioneer hoped that the farm he acquired would soon be a valuable property, and the only reason these hopes were not realized was because they were shared by too many people. Farm products were kept at so low a figure that the farm itself had likewise to remain low, so low indeed that the average return to the farmer was hardly above that of the common laborer, and frequently below that.

By the time of the outbreak of the recent world war it was beginning to look as though a new era had begun. The Neo-Malthusians were pricking up their ears, and licking their chops in anticipation of a fresh portion of theoretical nourishment. Was it not indeed evident that even America had crossed the dead line dividing abundance from necessities, and that for the future food was to be dear. The farmers were praying for the fulfillment of the prophecy. Prices were in their favor as they had not been in a generation. It was believed that with a judicious use of the tariff the long-postponed period of agricultural prosperity might be ushered in, and might stay.

The war gave us a new view of the balance between food and the demand for it. No sooner had the price advanced than increased quantities were forthcoming. In some instances the increase was slight, in others great. The acreage of the leading crops, fifteen in number, increased $12\frac{1}{2}$ per cent in two years. The increases in livestock were equally great. The farmer's purchasing power rose not only proportionally, but for a time even more. He needed no devices for influencing price levels. The price levels

were taken care of by forces outside of and beyond his control. He began to think the millennium had come and undertook to make himself secure in the new era by bidding up the price of farm land. No sooner had deflation begun than the weakness of his position was painfully manifest. On the farms, or in close connection with them, about one-third of the American people live. It is a matter of national concern that the buying power, never too large from the standpoint of the welfare of the nation, remains persistently below its pre-war level. For a time it was hardly above half that of 1913 to 1916. Now it is two-thirds. This means that in terms of groceries, clothing, implements, and whatever goes to make up the living of the farmer class, that the produce brought to market will exchange for two-thirds of what could have been had six or seven years ago. This is on the basis of wholesale prices. Retail prices are still further out of balance. The farmer comes to market with a basket full, and goes home with it a third empty. No longer is he complacent. He has worked as many hours as formerly; he has exploited his family in the traditional way; he has used his capital and his land as completely as in 1919. He receives pre-war prices, and pays prices still more than 75 per cent above the pre-war level.

Naturally and properly the farmer is asking in no uncertain terms, how this came about; how long it will last; and whether or not there is a remedy. The occasion for noticing the cause of the unbalanced condition is mainly in order to show the farmers' state of mind. The opinion is widespread that the slump in farmer prices was the result of concerted, malicious action on the part of bankers, packers and boards of trade. It has been explained by authorities great and small that the Federal Reserve Bank was guilty of too much liberality until 1919 and too much niggardliness since. It was free with loans while prices were buoyant, and discouraged borrowing when prices began to decline. Why retail prices broke first, why the farm products bought and sold on boards of trade held up for some months beyond those for which there is no future market, are left unexplained.

While the farmer is wrong in his explanation of why prices of his product fell first and farthest, he comprehends

the fact that railway charges are about double what they were a few years ago. Labor in general, that is organized labor, has been deflated but little, and the great class of middlemen and professional men are getting their augmented portions, many with effort, others almost automatically. What deflation labor has experienced has been mainly in the form of unemployment, the rate of pay having declined but little, and during recent months unemployment is decreasing, and the rates of pay creeping upward.

That labor is able to organize and maintain an effective monopoly is no longer an open question; it is a reality. Anyone who doubts this needs but to consider the wages received by the leading union labor groups. Approximately double the 1913 and 1914 wage rate is coming to be looked upon as the normal post-war pay of workers in the industries and in transportation. The pay received by the farmer for his efforts follows a different course, and apparently is governed by a different law. There is, however, no mystery about it. The labor groups, contrary to all the beliefs and predictions of a century ago, keep their wages close to the war level through limitation of output, effected by tangible means. The number of laborers in each trade is limited, and the work which a given laborer may perform in a day limited still more. Carpenters receive two and one-eighth times as much as eight years ago; miners twice as much per day; the whole railway employee list twice as much, and so following. The carpenters are not too numerous; the railway employees are not too numerous. The Federal Railway Board is able to approve of the status quo, and to agree from time to time that no reductions will be ordered until the following July. All of which means that the farmer, like the rest of us, pays double pre-war prices for houses, fuel, and transportation. The laborer sees red every time deflation of war wages is mentioned; the farmer sees red every time he looks at the balance in his account book.

The high price of labor enters into substantially every commodity and service. The leading item in the explanations offered in defense of high prices is the cost of labor. Lumber is dear. But at once it is shown that the lumber-jack gets \$50 a month, board and lodging; the latter items costing not less than \$20. The freight rate is high because railroad costs, half of which are labor, are double those of

a few years ago. The local lumber dealer meets all objections to complaints against the charges for his services by showing that he pays out \$100 for getting work done which a short time ago cost \$50. Coupling these costs with carpenter wages completes the cycle, and a dwelling house, or anything else made of lumber costs double the price of seven years ago.

The middleman passes the shock which he receives on the one hand to those with whom he deals on the other, and is little the worse for having acted as a transmitter. The manufacturer, whether he makes what we must have because of hunger and cold, or what we must have in social self defense, is able to save himself in large measure because he is not compelled to produce at any given moment, or in any foreordained amount. The manufacturer of leather goods was able to stop buying leather two to three years ago; the manufacturer of leather promptly reduced his bids for hides from 10 cents a pound to 2 cents. The packer made a corresponding reduction in the price of cattle. Thus the shoe manufacturer had little stock on hand when prices fell; the leather manufacturer had little on hand; the packer had much on hand, for a great portion of which he had paid almost nothing; while the farmer received for his cattle hides nothing at all, the hide, as it were, going with the tail. The farmer is thrown out of line because there is nobody beyond him to whom he can transmit the shock. In physics the same principle is illustrated by hanging a number of balls, attached to strings, in a row. By striking one of the end balls it will be seen that it hardly moves from its position, nor do any of the others until the one at the end is reached. This one flies out into space a distance determined by the force of the blow. The farmer is the ball at the far end and does not show signs of returning to his former position as promptly as does the ball in the physical laboratory experiment. How to regain this position is the problem not only of the farmer himself, but a problem likely to concern many non-farmers more than has yet been the case. What has happened is a shifting of margins, costs and incomes, in which the farmer is the loser. What can be done about it is becoming a vital national question.

Prices, so far as any one social group is concerned, may be influenced in some half dozen different ways. (a) By accepting the central market price, fixed by impersonal economic forces, and getting the largest possible share of it through economies in methods of bridging the gaps between producer and consumer. (b) By changing the price level. (c) By changing the demand for the goods in question. (d) By eliminating some portion of the competition among producers, as by a tariff. (e) By establishing a private monopoly. To these may be added still another, opposite in the direction of effort, but the same in outcome so far as the individual is concerned, that of lowering cost of production.

The first method, that of reducing costs and margins in marketing, has been tried from time immemorial, and will always remain but partially solved. On this stronghold the forces of the Grange, the Alliance, and several of their successors have broken. Even so the successes attained in influencing prices received by farmers have been achieved mainly through cooperative effort, the roads to market have been shortened, the number of hands through which goods pass have been reduced. The gain has been first to the farmers, and in many cases has later been shared by the consumer. More oranges have been marketed by the California Fruit Growers' Exchange, and undoubtedly the prices, one time with another, are less than would have been the case under the private management of the citrus fruit market. Cooperative elevators of the grain regions have for twenty years effected savings of several cents a bushel on grain but it has not made grain dearer. It has, however, put more money into farmers' pockets, partly by reducing the margins of grain buyers, but more by eliminating wasteful competition, substituting economic units for uneconomic units, to the ultimate advantage of all. So long as these cooperative companies do not control the major part of the product in which they deal they can not be indicted, much less convicted, on the charge of running a monopoly. The monopoly phase of farmer organizations will be noted later.

Through cooperative effort, the balance of accounts may be changed in the farmer's favor. As a means of adjusting the discrepancies such as now exist between farmers and the general industrial forces it is inadequate. Even were

the farmer at the present time able to get all of the central wholesale market price for wheat, milk and potatoes, he would still earn less per hour than the man who, after seven months' apprenticeship, repairs his automobile.

This suggests the second remedy, that of changing the price level. The price level expedient has its advocates ranging from Professor Irving Fisher to the recrudescient Greenbackers of the present Congress. Within this wide range are to be found those who believe that the deflation of the farmers' prices was maliciously brought about by a change in the Federal Reserve discount rate, and those who, accepting the evidence of facts, recognize the failure of the demand, the relative overproduction, and the weak position of the farmer in making readjustments. The scientific advocates of the stabilized dollar do not propose the plan as a remedy for an acute situation such as we now have. The purpose of the stabilized dollar is to avoid the ever-recurring cycles in which all classes of producers are involved. The difficulty now is the advantage and disadvantage respectively of the several leading groups of producers. The stabilized dollar would not, and could not, prevent the strongly organized class from getting an advantage over the weakly organized class.

Any plan, however successful, of changing the general level of prices would fail in the crucial test since it would raise, or lower, all prices simultaneously. What is needed is not primarily inflation or deflation. It is a restoration of an economic balance. Should our paper money philosophers of the Senate succeed in inducing Congress to print enough more money to raise the level of prices to any higher point they must remember that it will inflate retail prices and wages, just as surely, even though a little more tardily, as it will raise the prices of farm produce. It will create all manner of inequalities as disturbances of price levels always do, but the belief that it will act as a specific for the present ills is absurd. The faith which many of our agricultural writers have in a restoration of the price level to a higher point seems to ignore the patent fact that the farmer is not suffering from the decline of general prices primarily, but from the decline of his products below the general level. Of course the changes in the general level affect the size of outstanding obligations, and to the extent

that the farmer is in debt, he is hurt by falling prices and helped by rising prices. To reinflate for the purpose of this relief is however like exposing one's self to the small-pox in order to enjoy the chance of effective vaccination. The hazards are multiplied more rapidly than are the safety devices. For the complex ills attendant upon the present lack of balance among our producing classes the paper money medicine men will have to be classed with all other bootstrap uplifters.

Third in the list are the advocates of a change in the demand for goods. The cranberry growers use the suggestive name "Eatmor" as their leading brand. "Uneeda Biscuit" has been believed by a large enough number of people to bring the desired revenue to the manufacturers. The "Sunkist" orange has undoubtedly helped in popularizing the product of the orange orchards, and the advertising of milk appears to be producing results in an increased demand at a somewhat better price. Who has the courage, however, to hope that any system of persuasion will increase the aggregate amount of food consumed? The demand for the great bulk of farm-grown product is inelastic.

Fourth in the list are the proposals to appeal to the State. Of these there are at least three. The plain fixing of prices comes first and is the most naïve. If the Government could fix the price of wheat for the years 1917 to 1920 why not always? The fixed price, though not satisfactory at the time, has looked good in perspective. But price fixing appeals to those only who imagine that what can be done during a war can also be done in time of peace. The price fixer believes in a fair price, a term which has served to cover chasms of ignorance. A fair price must of necessity be a price fixed by authority. As popularly used it is not such a price, though just what it is few have seemed to know. May I venture to suggest a definition: At any given time a fair price is about ten per cent more than you can get.

Another appeal to the State is made by those who have lost faith in the ability of farmers both individually and collectively and turn to society for a solution. It is proposed that the State take over and run packing plants, elevators, mills, warehouses, and, in part at least, the banks. These people have lost faith in private enterprise with the State acting merely as umpire; have forsaken voluntary coopera-

tion as the way out; and call on the non-farmer to take a hand in the solution of the farmer problems. While the non-farmer would be in a small minority in some of the grain-growing States, in others, like Illinois or Minnesota, the non-farming population would be in control. To guard against this contingency it is proposed to unite with labor, and so present a solid front against big business. The laborer and the farmer are to settle the question of prices on the basis of what the farmer in fairness ought to receive, and what the consumer ought to pay,—another case of the lion and the lamb lying down together. The experience in State ownership and operation of industry may well give us pause in accepting the plan as a panacea. If, forsooth, we fear to take over the railroads in which manufacturer, laborer and farmer are interested, whose interests in the main coincide, how can it be hoped that a business in which one-third of the people are to prosper by keeping prices up and two-thirds by keeping them down can be handled to the advantage of the one-third? While an insignificant portion of the business is done by the State it may not result in an issue, and incidentally economies may be effected. If the program becomes general the advantage will be absorbed by the operators, society, and the farmer will get the world price for his wheat—exactly as he can now.

Still another proposal, which has reached the stage of a bill in Congress, is that the Government should buy the surplus of leading crops such as wheat and cotton. A price would be set months in advance at which this surplus should be bought, and since any given quantity as well as any other might be a part of the surplus no purchases could be made below the price set for the surplus. The Government, it is proposed, should tax back its losses onto the growers in the final settlement with the net result that the consumer would have paid a price fixed on the basis of the quantity needed, while the lower world price would obtain on the amount sold abroad, instead of on the whole crop. This is at least an ingenious plan, perhaps properly called a scheme, whereby we would compel the working of an all-around tariff, since of course a plan of this kind would fail utterly without a tariff. The price paid for produce under this scheme would be set by a board. Just how Congress would resist the importunities of other producers who would

find their prices unsatisfactory is not revealed. Should Congress undertake to buy all surplus, and through a board, or boards, set all prices it would lead us to conclude that in comparison with the difficulties here involved the theoretical objections to socialism are as "dust in the balance."

The fifth hope is that of a nation-wide pool, operating much like a monopoly. Operating after the manner of a monopoly, so far as outward appearances are concerned, does not, however, identify an undertaking as a monopoly. For example, the raisin growers have for some years marketed the bulk of the raisins. A case was brought against them charging violation of the anti-trust act. The publicity afforded brings out the fact that the company has control of the bulk of the crop. It projects a price, or scale of prices, over the season of sales. This is what is superficially seen. It looks much like monopoly, and possibly for the season it may technically be such. However, that which is not so clearly seen is that the growers' company has no appreciable control over the supply which it puts from year to year on the market. A given quantity of goods during a season will bring about what the demand for the same will stand whether offered by a group of producers or a group of dealers, each acting in its own interest. The real question is who gets the money. There is no evidence to show that the consumers are paying more for raisins, prunes, or apricots than would be paid were the cooperative companies to disband and independent dealers take charge of the produce. The good prices which they may receive stimulate a further production, and the larger quantity must bring a lower price per unit.

The charge of a farmer monopoly was perhaps loudest against the milk producers. In a few instances the officers of milk producers' companies were put in jail. In other cases Attorneys General camped on the trail of the farmers with the persistency of crusaders. The law was to be vindicated. One is tempted to suggest that these law enforcers had not met with much success in former efforts. In hunting big game they had met with discouragements only. The farmers appeared as smaller game easily bagged and the chance of bringing home at least something in the way of trophies was stimulating.

The real question that required an answer was whether

or not the farmers were to enjoy the privilege of collective bargaining. A law was recently passed granting that privilege, and great legal authorities have been disturbed over the prospect of exorbitant prices of foodstuff exacted by farmer monopolies. Every farmer monopoly, so-called, carries within itself effective antidotes to its own poison. It is of trifling importance that here and there a farmer marketing company may be able to get all the traffic will bear out of burley tobacco, raisins, or eggs; but that these organizations can have price-making power inimical to the interests of the public, or even price-making power beyond what would obtain through the operations of market forces, has not yet been demonstrated. That the farmers will be able to create a monopoly control of wheat, pork, beef, milk, or potatoes, comparable with the control now existing in the labor market, or in the anthracite coal business, is about as probable as peace in the Balkans.

The improbability of a genuine farmer monopoly, outside of a very few unimportant fields, is based on the very nature of the business. There are too many farmers, and immediately the interest of one runs contrary to that of the group. If the majority agree to grow few potatoes it is a signal to the minority to plant more. Again the weather is a factor as important as acreage, since the rain makers are not fully established and accepted, and no one has even attempted to stop the rain when there is too much. All of which spells disaster to the closing of the farmer monopoly circle.

A favorite means of influencing price in a wholesale manner in which the farmer has put his trust, is the tariff. No economic question is more complex; no political question more simple. A candidate gets into Congress by advocating a tariff on agricultural products; gets the tariff by voting for duties on manufactured goods; and holds his position because no one can demonstrate its ineffectiveness. A tariff on agricultural products has about the same relation to a tariff on manufactured products that an LL.D has to a Ph.D. To the contention that within ten or twenty years we shall be importing food it may be replied that in view of this prospect an agricultural tariff ten or twenty years from now might be effective.

A half truth is always harder to down than an outright

falsehood. In the case of the tariff on agricultural products one cannot say that it is ineffective since it does produce some effects. No one questions the operation of a tariff on sugar or on wool. But to reason by analogy that tariff on wheat is beneficial to the wheat grower, or on corn to the corn grower, is to beat the tom toms.

Mention may be made of the appeal for cheaper credit. This appeal takes two forms. The first is for credit for farmers so cheap as to constitute a subsidy and induce greater production in the interest, not of the farmer alone, but of society. The more reasonable proposal is for such changes in credit facilities as are needed in order to give the farmer as much and as favorable credit in proportion to his needs as other business men are getting. To the latter proposal there is no objection. It is imperative indeed that it be done. However, cheaper credit is no cure for the farmer's ills. It is like lending to a man who is being systematically robbed. It may please him at the time, but fails both to restore his goods or stop further loss. What the farmer needs now is not a loan to make up his deficit for the moment, which must be paid back later, both principal and interest. True enough the loan may be needed, and it may be of great help, but a solution of the malady it is not. It is much like giving a crutch to a man with a broken leg. No doubt a good thing, but of much less importance than surgical attention. The farmer has need of the crutch, but he should not be left a cripple for life, making the crutch a permanent necessity.

Having rejected one by one as inadequate the whole medicine cabinet of remedies and nostrums, must the conclusion be that the case is hopeless? So far as any quick and painless method is concerned it unquestionably is. The real trouble with the above prescriptions is that one and all they are written without any close attention to the troubles they are designed to cure. It is necessary first of all to see why the farmer is in economic distress. Moreover, the diagnosis is not a very difficult one. In the years 1916 to 1920 inclusive the customers crowded the farmers' counters for goods, paid any price, and paid cash. It was a sellers' market. The energy of the whole western world was centered on war, and its immediate after effects. The regular sources of food supplies were shut off. The future was

mortgaged for purchasing power, old securities were sacrificed, bonds were issued, chattels were sold. The farmer was urged by prayers, patriotism, and profits to produce to the utmost, and produce he did. All of a sudden his customers left him, some because they could buy at lower prices elsewhere, others because they were cultivating once more their old fields, and still larger numbers because they were bankrupt. That they were, and still are, hungry and starving is of secondary consideration. The purchasing power is wanting.

Still the farmer continues to produce. Providence has afflicted him with crops of unusual magnitude. The results are inevitable and their explanation required no occult power. During the war we ran short of houses, furniture, and machinery. The capitalists are playing a conservative rôle and holding much the same position as in former years. The laborers seeing that their contributions are indispensable are meeting the situation effectively by putting upon the market no more of their wares than will be taken at a predetermined price. They are acting in a perfectly logical, perfectly selfish manner. The farmer having no means of limiting his output throws upon a glutted market a mass of goods not keenly wanted and wonders and complains at the ruinously low prices paid. The logical way to make farmers prosperous is to lessen farming, just as the coal operators are prosperous because there is too little, not too much coal above ground.

The prices of farm produce may be influenced fundamentally only by conformity to economic law. In spite of all advantages to be gained through improved marketing, and they are many; in spite of economies in production, and they will always be basic in farm prosperity; in spite of whatever merit there may be in improved credit, and the tariff; in spite of all these it will be necessary to balance agricultural production against the demand for it. No doubt this is a truism, but no doubt also it is not appreciated. A wider market offers relief, and a wider market is available, but not easily so. For years we have sent our surplus agricultural produce to Europe. Now Europe is in debt to us and we are saying to our debtors that the obligations must be paid, but not in goods, presumably then in cash. But Europe has goods, potentially enormous quantities of

goods, but no money. Our drum-beating nationalists are determined that the goods shall be kept out, and the cash demanded. The advantage of the exchange of goods for goods is denied and mercantilism, thinly disguised, is paraded as the most modern doctrine.

The program that would bring the greatest relief to the farmers would be for a fifth of them to leave the farms, and break into the better paying professions, trades, and businesses. Those leaving might be no better off, but this would at once weaken the power of the groups holding prices up artificially, whether they be laborers or capitalists. If a dollar an hour is too much for the man who repairs automobiles, more farmers' sons going into that line of work would bring it down, and incidentally increase the rate of pay to those remaining on the farms. In reducing the number of farmers relatively, and it must take place before prosperity returns, it would be fortunate indeed were some plan devised whereby those on submarginal land might be removed first. The help of the State should be enlisted in this direction. It is actually being done in Michigan and in Alberta. Many of our States are still begging for settlers, and recommending their untilled acres. It is unusual for the State to use its influence or its money in helping people to get off of sub-marginal land. Why it is not as well within the sphere of State activity as to assist settlers to get onto such land is not clear.

The counter-part of the same program is the rehabilitation of the buying power of Europe. Could this be accomplished and in some degree it is clearly feasible, the farmer would be the first and greatest gainer, since food is what Europe most needs.

The decrease of production and enlargement of the market are major considerations, and the plans for carrying them out are above and beyond all questions of petty politics and immediate advantage. They call for statesmanship in the formation of policies and likewise in their execution. In these considerations are involved such fundamentals as land utilization, land settlement, immigration, and trade relationships. All these matters are constructive. Not so clearly so are those relating to the unduly large share of the national dividend at present going into the payment of wages and monopoly profits. Monopolies must,

eventually, be socially controlled, or the farmers and with them many others will be reduced to peasantry, or its equivalent. Unless intelligent direction or economic harmony, or both together restore the farmer's buying power within a short time he must of necessity reduce his standards of life, a national calamity.

More immediately must we recognize a class struggle between farmer and laborer at the very time when they are courting each other? All sentiment aside, whenever the farmer rebels, as he properly should against freight rates, the price of lumber, the cost of a suit of clothes, a Wilton rug, or barn fixtures, all of which are double the prices of 1913, he will find that the cause of the high price is primarily labor. The philosophical question is whether labor can succeed in reducing the standard of living of the farmer class; the practical question is whether the farmer will come to see the cause of his financial distress, and act accordingly. Organized labor has successfully resisted deflation thus far. Unorganized labor has little power of resistance. Even so, farm labor is higher relatively than farm products, and will manifestly remain so during the coming year.

The farmer would be unwise to attack labor directly. Neither is it true that organized labor in general is paid too much. The serious question is whether from the national standpoint it is either possible or desirable for organized labor to hold the prices of goods and services at a point 77 per cent above the pre-war level. Is enough being produced to warrant such payment? Can the level be maintained with the purchasing power of the farmer so out of line? In all reason the present condition cannot last, or should it last, it means that farmers will accept a lower scale of income and become inured to it. An attack on railway rates and the prices of manufactured goods is in order.

Some amusing articles appeared a year or two ago entitled: "What If the Farmer Should Strike?" The sort of strike there considered is about as likely as snow in summer, and as pleasing as rain in harvest. However, another sort of strike he cannot stage too soon: a buyers' strike against goods and services relatively twice as high in price as his own. It is a painful method, but the sooner it is done, the less will the farmer class sink in the scale of living.

CONTROLLING AGRICULTURAL OUTPUT*

H. A. WALLACE

EDITOR WALLACE'S FARMER

*Adjusting Production to Demand Benefits Both the Farmer
and the Public*

Farmers have just as much right to organize to control their output as union labor has to organize for the purpose of shortening hours and increasing wages. They have as much right to cease production wholly or in part as union labor has to strike. It is no more wrong for farmers to reduce production when prices are below cost of production than it is for the United States Steel Corporation to cut pig iron production in half when prices are rapidly falling.

Most common-sense people who are familiar with developments in the worlds of union labor and big corporate business are willing to grant that the farmer has the right to organize to control his output. A few, however, and some of them are farmers, say that the production of food is peculiarly sacred, and therefore any attempt to control the output of food should be regarded as illegal. Of course there are many good arguments to support his position, but farmers can not allow it to be adopted as a national viewpoint unless the Government is willing to step in and safeguard their production by national crop insurance and price stabilization schemes with the object of relieving the farming business of its peculiar hazards. In such case the farmer would be put in a position somewhat similar to that of the railroad men under the Government railroad board, and like them, would rarely be justified in striking.

PRACTICABILITY, NOT RIGHT, IS BIG QUESTION

The big question is not the right of the farmer to organize to control his output, but the practicability of so doing. Corporate business subject to the decision of a few men thoroughly posted on supply and demand conditions, can control production promptly and with profit. Union labor

*Read at the annual meeting of the American Farm Economic Association, Chicago, December 28, 1922. Published in Wallace's Farmer, January 12, 1923.

is also largely subject to the decision of a few leaders, but its big advantage over farmers in the controlling of production lies in the fact that public opinion among city laborers is much more easily enforced than among farmers. The man who increases his cotton or corn acreage in a time of great overproduction when an acreage campaign is on, is a "scab" just as much as the man who takes the job of a striker. Farmers, however, do not come in close enough contact with each other to make a man fear loss of standing among his neighbors if he is a "scab."

Moreover, there is a far greater variation among farmers than there is among corporation managers or union laborers. Nearly a fourth of the agricultural output is controlled by absentee land owners, many of whom are bankers and merchants. Another fourth is controlled by tenants who have very little surplus funds and who are guided in their actions largely by the immediate necessity of meeting pressing obligations. Not quite a fourth of the agricultural output is controlled by men who own their own land, but who are densely ignorant concerning the world supply and demand conditions and the forces which make farm product prices. Almost a third of the agricultural output is controlled by intelligent land-owning farmers who are to some extent familiar with world price forces, and who have sufficient sense of class solidarity to act together in the control of their output. These men, however, are strong individualists, who have forged ahead in the world by being willing oftentimes to act in exactly contrary fashion to the majority of farmers, and some of them have come to the conclusion that so far as they personally are concerned, they stand to gain one year with another under chaotic production conditions which enable them to gain at the expense of those ignorant and poverty stricken farmers who don't know just what is going on. Agriculture has never yet suffered enough hardship to induce these four classes of men to act together on any problem whatsoever.

The practicability of controlling the agricultural output varies tremendously with the product. In the case of fat cattle, for instance, it would seem practical for farmers to make a definite effort to fit the supply to the demand. Nearly half of the well-finished cattle of the country are

fattened in Iowa and most of the other half are fattened in western Illinois, northern Missouri and eastern Nebraska. It can be ascertained how many fat cattle the market can handle at different weeks throughout the year when labor is fully employed and also when business is depressed. At the present time fairly accurate information is available as to the numbers of feeder cattle which are shipped out week by week from the leading feeder markets into the different States. With fairly accurate measures of supply and demand available, and with the business of producing fat cattle fairly well centralized in the hands of some 15,000 men in Iowa and the States adjoining Iowa, it would seem practical eventually to organize to control the output of fat cattle.

MILK PRODUCERS' SYSTEM NOT THE BEST

The organized milk producers which supply the larger cities are already controlling their output to some extent. However, there has been a tendency for them in their bargaining with the dealers to center their attention quite largely on matters of price. The net result in many cases has been that a higher price has been enforced for a time than fundamental supply and demand conditions really justified, and of course the upshot of the whole situation has been eventually an over-production of milk which has seriously undermined the power of many milk producers' organizations. Instead of recognizing the true cause of their difficulty, many of the milk producers' associations have concluded that the next step for them was to build condensories to take care of the surplus, and in some cases they have gone into the distributing business themselves.

It would seem that one of the most important functions of a milk producers' association in its bargaining with the dealers would be to set prices at such a point as neither to increase nor decrease unduly the volume of production. If, for some reason, it is advisable for a time to set price decidedly above cost of production, it would also seem advisable at that time for the officers of the association to send out a continuous stream of publicity to the membership, telling them of the situation and advising them of the danger of overproduction. It may never be possible for

the officers of a farmers' organization to control production in the same definite way as the managers of a steel corporation. It should be possible, however, to create public sentiment so when one man acts contrary to the actions demanded by the interests of the group that he will be decidedly conscious of having lost favor in the neighborhood.

CALIFORNIA ASSOCIATIONS CONTROL DELIVERY

The California people with their fruits have apparently never been interested in controlling the volume of their production, but they have controlled with the utmost nicety, with regard to time and place, the delivery of their production. They are orderly marketing experts par excellence. So far as volume of production is concerned, they have always gone on the theory that there was no limit whatsoever to the consumption of their fruits if they only used advertising in the proper way to stimulate the appetites of the consumers. Nevertheless, I venture to say that the day is not far distant when the various California coöperatives may wake up to the fact that they will have to concern themselves with controlling the volume of their production or else they will have to set a price close enough to cost of production so that the price itself will serve to control the volume.

It is unthinkable that they should go on as they have been going, setting prices so far above cost of production as to double and treble land values and at the same time bring in a constant stream of new production. The California coöperatives in the near future must surely either make an effort to control their production directly or else set their prices so close to cost of production that further expansion will largely be discouraged. Of course, it may be that they will go blindly onward doubling and trebling the acreages of their fruit crops and still inviting further expansion by setting unduly high prices. In that case, however, there will come some such sad day of reckoning as has come to the rubber producers during the past year. The newly planted vines and fruits will eventually come into bearing and it will then be necessary either to destroy them in great part or else to slash prices far below cost of production. Of course, the demand for fruits is much more elastic than

the demand for standard foods, but even with fruits there is ultimately a limit to consuming power.

The United States Department of Agriculture is apparently making a very interesting effort to direct attention toward the advisability of controlling the output of potatoes this year. The crop is about 434,000,000 bushels, or about 17 per cent above normal. This surplus of 17 per cent has been sufficient to depress the price so far below cost of production that in parts of the west the price has not been sufficient even to pay for the cost of digging. To meet the situation and to control in some measure the volume of potatoes reaching terminal markets, the Bureau of Agricultural Economics has put on an educational campaign urging potato farmers this year to send only their very best quality of potatoes to market. Figures have been put out illustrating how much greater is the net return from a carload of high-grade potatoes than from a carload of mixed potatoes. The idea is that the farmers should grade their potatoes much more closely this year than in the ordinary year, and that they should keep back a much higher percentage to feed to their live stock. They are told that four or five pounds of potatoes are equal in feeding value to about one pound of corn. A program of this sort is the soundest of common sense and even though it is energetically conducted there is no danger of arousing the ire of the consumers.

Acreage reduction campaigns as a means of controlling agricultural output are a rather thankless job. Soon after the war closed, Wallaces' Farmer recognized, as did every one else of any economic intelligence, that the grain prices which had been so much out of line on the plus side during the war, would doubtless go just about as far on the minus side in the inevitable reaction. For several years, therefore, we continuously advised our readers to put back into grass those marginal corn acres which they had plowed up as a result of the war appeals to patriotism and to profit.

Especially in the early spring of 1921 did we run a large number of editorials pointing out the surplus of corn then on hand, the low prices, and the desirability of resting some of the hard-worked corn land by putting it into clover and other soil-building crops. The corn crop of 1921 was a large one, and while by that time the prospects were for

an improving demand situation, we nevertheless saw no prospect of corn selling as high relatively as the things which corn belt farmers must buy, and we therefore believed it wise to center the attention of our readers more vigorously than ever before on the necessity of reducing the corn acreage sufficiently so that there would be no more than the normal supply of corn on hand in the fall of 1922.

We pushed the matter very vigorously during the spring of 1922 and were able to secure the whole-hearted backing of the Prairie Farmer and the half-hearted backing of two of the State Farm Bureau federations. Opposition came from every source imaginable. Radical farm papers of the type which are guided even more by the necessities of union labor than they are by the needs of the farmer were dead against it. Over on the extreme right came opposition from the organized grain trade and the financial interests of the east. They were afraid that the farmer would become inculcated with some of the insidious notions of union labor, and thus undermine the foundations of our civilization.

There was some division of opinion on the matter among the farmers themselves. Most of them favored it theoretically but when it came to applying it on their own farms they were decidedly doubtful. The tenants couldn't afford to reduce their corn acreage even though their corn sold so cheap that they received only 15 cents an hour for their labor put on the corn. They felt that they couldn't make any reduction for the simple reason that there was no other crop with which they were thoroughly familiar which would return to them more than 15 cents an hour. Land owners with heavy mortgages were in exactly the same position as the tenants. The really effective support for our program came from those land owners who were in fairly good financial position and who saw that a reduction in the corn acreage would mean that they would have to hire less outside labor.

Thousands of farmers stated that they would be glad to make a cut in their corn acreage if they could be sure that every other farmer in the corn belt would do likewise. A few men stated that just in so far as their neighbors cut their corn acreage they would increase theirs. Here we see working that old shrewd instinct among farmers which

has made money for so many of them—the principle of acting exactly contrary to the crowd. It is a sound principle in a competitive world but not in a coöperative world.

Mr. C. W. Reed, who handles the Iowa Weather and Crop Reporting Service, stated to me last spring that in his opinion the economic situation was such that there would be an increase in Iowa corn acreage rather than a decrease. He said that the tone of his correspondence indicated that there were so many men who were absolutely hard up and who felt that corn was their only money-making crop that there was danger of a five or even a ten per cent increase in corn acreage.

We were much pleased, therefore, when the preliminary government figures issued in July of 1922 indicated a reduction of 287,000 acres in corn in Iowa and Illinois. This represented around 10,000,000 bushels of corn, and inasmuch as there was grave danger of an increase if we had not put on the campaign, we felt that we had almost certainly benefited the price of corn by at least two or three cents a bushel. The really great object of the 1922 corn acreage reduction campaign was to talk to the organized grain trade and the big financial people of the east in language which they could understand. These people have their ear to the ground for movements of this kind. They never realize how desperate the situation may be among the farmers of the middle-west until something of this sort penetrates their consciousness.

In spite of all the knocks which we received on this corn acreage matter from the right and left wings of our national thought, I am convinced that as a direct result of this reduction campaign the farmers of the middle-west are several million dollars further ahead on their 1922 crop than would otherwise be the case. The thanklessness of leading an acreage reduction campaign of any kind comes from the fact that just in so far as you are successful in raising the price toward cost of production, just in so far as you are criticized by those who reduced their acreage and thus made the rise in price possible.

Controlling the acreage is absolutely essential to any genuinely effective control of crop output. Of course, much depends on the weather, but the safe assumption in that

case is to do just what every other business man does, and that is to take into account the probable risk and act accordingly. All that can be assumed for any year is that the weather for that year will be average. If the supplies that spring are far above normal and if the price is far below cost of production, it is a sound indication for a reduced acreage. Very few of our farm organizations, however, are sufficiently close knit to put on an effective reduced acreage campaign. The difficulty is that if the people of the conservative type of mind put on such a campaign, those farmers who have been habitually allying themselves with union labor in their political views will oppose it as a device of the board of trade and capitalists. On the other hand, if farmers of more radical views put on such a campaign, the conservatives are likely to oppose it as a hare-brained scheme of the radicals. Concerted acreage reduction campaigns of staple crops are therefore almost impossible as long as fierce jealousies are separating the different farm groups.

From the viewpoint of national agriculture there is a broad educational campaign which should be continuously conducted looking toward the molding of the volume of the agricultural output. Our international trade relationships have been decidedly changed as a result of the war. Following our Civil war, when we were opening up the great West, Europe invested billions of dollars in our railroads, and up until the time of the World War we paid Europe the several hundred million dollars in interest which we owed her every year by sending her wheat, pork and cotton to balance the account. Today we still have the wheat, pork and cotton to sell to Europe, but Europe no longer has that several hundred million dollars of credits with which to buy our wheat, pork and cotton so easily. On the contrary she must presumably send us even more in interest charges every year than we ever sent her. There was never before in the history of the world such an overwhelming reversal in international trade relationships.

Europe needs our wheat, pork and cotton, but how is she going to develop the effective buying power which will enable her to pay the price for our wheat, pork and cotton which will warrant us to continue producing a surplus for

her? That is a problem in controlled agricultural output which has to do with the entire nation and which is worthy of consideration by the entire nation. It is a problem which should be faced squarely by whatever administration happens to be in power. Because of the high tariff on manufactured goods, which makes it more difficult than ever for Europe to create the necessary credits in the United States for purchasing our surplus wheat, pork and cotton, it would seem to be a duty of our present administration to dig into the problem with unusual vigor.

Is there any way possible of providing Europe with the necessary credits so that she can pay us cost of production for our surplus farm products? If there is not, it is the part of wisdom for a courageous, clear-sighted government to tell the farmers frankly and to aid them in readjusting their production of wheat, pork and cotton so that their supply in the future will more definitely fit the demand at a price representing cost of production one year with another.

I clearly recognize that in the long run every economic evil creates its own cure. If prices of farm products continue sufficiently long below cost of production, there will eventually be forced into bankruptcy enough farmers so that there will no longer be a disastrous surplus. At the same time there will be readjustments of land values, wages, etc., which will lower the production costs. Economic affairs always work themselves out if you leave them alone. However, it is equally certain that they will work themselves out even though you tamper with them. The disadvantage of tampering is that those who do the tampering are likely to be reviled by about half the population.

I must confess that I personally am so constituted that I favor a certain amount of tampering with economic affairs. I believe that it is a needless waste for America to send thousands of her farmers into bankruptcy in order that eventually her production may be restricted to the amount which permits of a surplus for which Europe can pay cost of production. I believe that it is time that we were beginning to make some effort to understand the nature of the supply of and demand for our agricultural output with the object of eventually controlling it in some measure. And

this is not a matter that should start slowly in the dim and distant future, but a matter for the most earnest consideration in the seething present. It is a matter involving international relationships. But who is more vitally concerned in these international relationships than the 6,000,000 farmers in the United States?

The corn and live stock situation during the past six months has sufficiently changed so that Wallaces' Farmer will not put on a corn reduction campaign in 1923. In fact, we may advise our readers to plow up some of the clover which we advised them to seed down in 1920, 1921 and 1922. We continue, however, to be vitally interested in matters of controlled production, for we feel that this is not only a vital problem in the present disturbed international situation, but also in the entire scheme of civilization down through the centuries.

DISCUSSION: ELWOOD MEAD, UNIVERSITY OF CALIFORNIA

I agree with Mr. Wallace that farmers have a right to organize to control their output. I believe this nation would be the gainer if such an organization were functioning today. It would solve a distressing problem if production were reduced until farmers could get fair prices and have a labor income which would more nearly approach that obtained by city workers. This is not the first or only time when this nation would be better off if demand was closer to supply. About thirty years ago corn in Nebraska sold for seven cents a bushel because the farmer thought only of getting title to land. He ignored markets and sold corn for less than the damage done to soil fertility. It's one thing to believe in restricting production but a very different one to bring it about. The farmer is enmeshed in such a network of interlocking interests and is so adverse to the restraint that cooperation imposes that he will not harmonize his scattered desires and interests so as to direct them to a single end. Then the arguments for restricting production do not apply with equal force in all sections of the country. It will make no headway in the eastern and south Atlantic States.

In New England where rural population and the products of the farms have been declining for two generations, there

will be strong objection to any movement which looks to reduction of output. What they desire is that the neglected lands should be brought back into cultivation so that they shall cease to ship apples from the Pacific Coast and milk from Canada.

There is no section of the country where the control of output is being more seriously and sensibly discussed than in the State of California. There the organizations for the marketing of products are bringing about a change in the farmer's attitude. The experience of the members of the great cooperative associations of that State have brought them to realize that the success of the individual is tied up with the success of all other individuals engaged in the same field and from a study of the problems of marketing they are coming to realize more clearly than the country generally the relation of supply and demand. Just now the question of restricting the planting of trees and vines is being seriously discussed. The rapid increase in the acreage of raisin grapes which has gone on for the last few years is recognized as likely to lead to a surplus and to a drop in prices like that which happened when the Middle West grew too much corn.

But while the arguments for control of output may seem adequate to those already engaged in meeting the demand, they will not control the action of others. For instance, there are a million acres of irrigable land provided with water subject to water charges which can only be made profitable through growing high-priced crops. Doing this means to increase the annual value of products from 10 to 30 fold and the land owner who owns a grain farm is certain to plant a vineyard or orchard at the earliest possible opportunity. To him the solution of prices is in the creation of new markets, in an educational campaign like that carried on by the citrus growers, the raisin and prune growers to bring their products to the attention of all the people and by creating demands that did not before exist, extend their markets in a way that once was not thought possible. Then there is the difficulty of introducing cooperation and teamwork among people widely separated. Our farmers have not been trained to think collectively. Many who would be willing to restrict output if they were sure that their neigh-

bors would do the same have a profound skepticism with regard to this. For generations we have trained each farmer to hoe his own row and shift for himself and this attitude will not be overcome for another generation. It must be preceded by easier forms of cooperation such as combinations in marketing and these combinations must be decentralized so that they will be founded on neighborhood units where people, who touch elbows with each other and who can meet together and talk things over, can be trained to assume the responsibility which cooperation imposes.

Another difficulty in controlling output will be the opposition of the consumer and this opposition will be fanned by propaganda of the city dealer in farm products. How effective this can be has been shown in the experience of milk producers' associations. It has been practically impossible to get the city purchaser of milk to recognize the seriousness of the plight which led farmers to organize and to realize that unless milk could be produced at a profit in the end it would not be produced at all. They were in touch with the distributor. He could talk to them about the milk producers' trust and thus throw a dust screen about his own exactions.

A friendly and sympathetic attitude on the part of consumers towards the farmers' efforts to so plan production that it will meet but not go far beyond the known needs of our own and assured foreign markets is one of the important factors in restricting production. This can be much more easily gained if it is preceded by an improvement in marketing methods which brings the producer and consumer into more direct contact with each other. Organization to control output in farming must have considerable support from public sentiment. And before it can be brought about there must be a campaign of education of the city consumer. The city press largely reflects the attitude of the city population. The individualistic consumer is likely to break away from an organization if he finds his daily paper attacking it. Thus far the apathy of the city consumer, his reluctance to organize and his unsympathetic attitude toward the problems of the farmer has been one of the very serious obstacles to rural betterment.

THE USE OF CROP REPORTS BY FARMERS*

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Mr. President and Gentlemen:

It is relatively easy to show how farmers benefit directly and indirectly by the use of crop reports by others. The publication of unbiased and dependable crop reports by the Federal and State Governments tends to prevent the issuance of incomplete and misleading reports by private agencies and therefore also tends to stabilize the market. Speculation thrives upon uncertainty and to the extent that the official crop reports eliminate uncertainty, speculation is discouraged. Also, the greater the degree of certainty as to the size of crop surpluses the less risk there is in buying and holding crop surpluses until they are needed for consumption, so that middlemen can afford to conduct their business on smaller margins, charge lower commissions, and pay higher competitive prices to producers. Transportation companies use the crop reports in estimating the number of cars that will be required to move the crops, and by better distribution of cars better service results to the farmers. Bankers and financial institutions use the crop reports as an index of the amount of capital that will be required to finance the growing and marketing of crops. Crop reports are, of course, a prime factor in the marketing of crops, and to the extent that they facilitate orderly marketing farmers are benefited. Insurance companies which deal in crop insurance use the crop reports and statistics as a basis for establishing fair premium rates. I am told that in counties where crop estimates are available for a series of years the insurance companies have reduced their rates as much as 25 per cent in comparison with countries for which such data are not available. I am also informed that in some States the annual estimates of crop production have been used as a basis for equalizing taxation on farm property. Another way in which farmers are benefited indirectly by the crop reports is the use of such reports by merchants and manufacturers as an index of buying power of farmers and as a guide to the production, distribution, and sale of farm machinery, equip-

*Read before the American Farm Economic Association by J. A. Becker for Mr. Estabrook, at Chicago, December 28, 1922.

ment, and supplies. From six to twelve months are required for the cycle of operations involved in buying raw materials, converting them into manufactured products, and distributing them to the country merchants for sale. It is a great convenience for farmers to be able to buy their machinery and supplies when needed. Also, to the extent that farmers and merchants can better estimate the demand for their wares and avoid losses from overproduction and bad distribution, they can afford to charge less for the risks involved and supply farmers at lower prices. Crop reports are also of fundamental importance to organized agencies for the promotion of agriculture, such as the Federal Department of Agriculture, State colleges of agriculture, State extension services, and other institutions, especially with reference to constructive programs of production and marketing. These are positive benefits which accrue indirectly to farmers from the use of crop reports by others.

How can farmers use the crop reports directly to advantage? This question may be answered from two points of view: first, from the point of view of the individual farmers, and second, from the point of view of farmers acting collectively.

There are various reasons why it is difficult for the individual farmer to use crop and market reports effectively. On the 61½ million farms of the United States are many farmers who do not read crop reports or farm papers. Necessarily they must be ruled out, because if they do not read the reports they can not very well make use of them as individuals. Many other farmers who read farm and city papers containing crop and market reports do not realize their significance and value and consequently are indifferent to them. Still other farmers who appreciate the value of having timely and dependable information on crop production and distribution, do not know how to use such information in connection with their own business. Relatively few of the farmers of the United States see the crop reports as they are issued by the Department of Agriculture, because the mailing list is necessarily limited to those who cooperate in some way with some branch of the Department. As a matter of fact farmers are primarily producers and the business of production absorbs most of their time, thought, and energy throughout the year.

While marketing is the other half of agriculture and equally important with production, the farmer's experience in marketing and his contacts with the business world are necessarily limited. Many farmers, therefore, hardly know how to make use of the crop reports to advantage.

The Department has no means of knowing how individual farmers make use of crop reports except from occasional statements sent in by the voluntary crop reporters and county agents. Such statements indicate that many practical, wide awake, progressive farmers use the reports as a guide to marketing, especially as to time for marketing, and as a guide to planning, especially as to increasing or decreasing the acreage of a given crop.

In 1919 a questionnaire was sent to county reporters of the Bureau of Crop Estimates, to which 850 replies were received, and it may be of interest to analyze these returns. Ninety-nine per cent answered affirmatively the question, "Do crop reports enable you to keep posted on crop conditions?"

Ninety per cent stated that the information contained in the crop reports was of practical help to them. Of these 68 per cent gave as the reason the use of information on market conditions and prices, 19 per cent the use of general information, and 13 per cent the use of information on crop conditions. Of the 10 per cent of the total number who replied that the crop reports were of no help to them, 30 per cent stated that it was because farming and marketing are governed by local conditions, 15 per cent gave miscellaneous reasons, 12 per cent stated that the reports were too voluminous or complicated for the average farmer, 11 per cent stated that the reports are received too late for use, 11 per cent that the reports are of more use to dealers and speculators than to farmers, 9 per cent that the information could be obtained from the newspapers, 7 per cent reported that they were not farming, and 5 per cent expressed the opinion that the crop reports are not a safe guide for farmers.

To the question, "Which part of the crop reporting service is of most interest to you," 39 per cent stated that the reports on specific crops or crops in particular regions were of most value, 21 obtained most benefit from the live stock reports, 13 per cent stated that they were interested in reports of market conditions and prices, 10 per cent were interested in acreage and production, and 6 per cent in the crop condition reports.

Of 466 replies to the question, "Can you cite instances where the crop report has benefited you financially," 89 per cent were affirmative and 11 negative.

Forty-three per cent gave specific instances of profiting by selling and buying in accordance with market conditions, as indicated by the crop reports, 33 per cent simply reported gains, such as "Ten per cent gain on potatoes," 24 per cent stated that they had profited by increasing or decreasing acreage or production, or by changing crop rotations in accordance with information contained in the reports.

To the question, "Can you cite instances where you or your neighbors lost by failing to utilize the crop reports," 218 replies were received, of which 77 per cent were affirmative and 23 per cent negative. Of these 64 per cent stated that losses were incurred by failure to buy or sell at the proper time, 20 per cent reported losses by failure to increase or decrease acreage or production or to make the proper changes in crop systems, and 16 per cent simply reported losses without giving a reason, as "\$100 loss on wheat."

Of the answers to the request for specific suggestions for improving the crop reports to meet the needs of farmers, 26 per cent suggested more reports of surpluses and shortages and their locations, 17 per cent recommended a wider distribution of the reports, 13 per cent wanted to see monthly reports on live stock, 11 per cent wished to see the crop reports published in all the newspapers, 10 per cent suggested cooperation of the crop reporting service with the farm bureaus, 8 per cent wanted crop reports by counties, 7 per cent wanted more maps and diagrams, 5 per cent recommended that measures be taken to prevent the crop reports from reaching dealers and speculators first, and 3 per cent wanted reports on foreign crop conditions.

Many farmers in answering this questionnaire cited specific instances of substantial gains by either marketing their potatoes, apples, or grain promptly, or holding off and obtaining better prices later, basing their action on a study of the crop reports. One farmer stated that for several years he had obtained top prices for all his surplus grain and live stock by watching the crop reports and forecasting in his own mind what the probable trend of prices would be. Other farmers gave instances of profiting materially by increasing or decreasing the acreage of a particular crop.

It is quite evident, therefore, that to the individual farmer the crop reports serve three very useful purposes; first, as a means of keeping informed of the condition and crop prospects throughout his own State and in other States in which the crops that he is particularly interested in are grown; secondly, as a means of judging the probable relative supply of surplus crops he is producing and whether it will probably pay him to sell his surpluses promptly or hold them for a period with a reasonable prospect of realizing higher prices later; and third, as a means of judging whether it will probably pay him to make any change next year in his established crop system. The potato grower of the South can and probably does study the potato estimates of the main potato producing States of the North, especially the January report of stocks on hand. If it appears that the stocks are relatively heavy and ample to supply the commercial demand until the new crop is available, he will be inclined to decide that it will not pay him to materially increase his acreage, or, if his crop is already planted, he will plan to rush them to the market as early as practicable. If the potato stocks of the North are light, he will feel justified either in enlarging his potato acreage or in marketing them slowly in order to benefit from the rising prices in prospect. On the other hand, the potato grower of the North should study the estimates of early potato acreage and production in the South, so that he can make any necessary adjustments in his own planting plans. He should also study the estimates of the northern potato crop closely in order that he may market his own crop intelligently. A few years ago the crop reports showed a relatively large potential crop of potatoes, but also such serious damage from blight and rotting in the field late in the season as to indicate a material shortage. Our field statistician for New York reported that in a portion of his State where the blight was especially severe and potatoes were rotting badly, the growers were making every effort to store their potatoes because they estimated that potatoes would be scarce and high in price later. In other portions of New York where yields were good and the potatoes were sound, the farmers were rushing them to market with the idea that there would be a bumper crop and oversupply and lower prices. The attention of the State Extension Service was called to this anomalous situation and the growers in the blight

stricken areas were encouraged to sell their potatoes for immediate consumption and avoid loss from rotting, while the growers with large crops of sound potatoes were encouraged to store them for sale and consumption later.

Farmers should realize also that they are in competition with each other and that different areas of surplus production and different varieties are competing at the same time for the same markets. By studying the crop and market reports they can keep informed of what their competitors are doing. One of the commonest characteristics of men is a marked tendency to judge of conditions throughout the United States by the conditions in their own locality which come under their personal observation, and this tendency is by no means confined to farmers. As a general rule crop conditions are not uniform even in a single State and the only way to get a true picture of the country as a whole is by studying the crop reports.

I have dwelt at some length on the problem of the individual farmer in making use of the crop reports because the individual farmer is not in as good position to use the crop reports effectively as are the business men and agencies that deal with crop surpluses after they leave the farm. His turnover is relatively small. It comes usually but once a year, and he lacks capital, the marketing experience, the business contacts and knowledge of the essential factors of the current marketing situation necessary to enable him to act quickly, effectively, and to the best advantage in competition with alert business men. It is impracticable for any public agency to supply these deficiencies in the situation, equipment, and opportunities of the individual farmer. The best that public agencies can do for the individual farmer is to supply him with the latest information as promptly as possible in the form of crop and market reports.

The situation is quite different with farmers acting collectively. Farmers' associations are usually in a position to maintain a good business organization and to employ business men of ability and experience in merchandising. Through their membership the association can control farm products in sufficient volume to make various economies possible. They can standardize and grade their products. They can readily obtain capital with which to move, store, and market farm products. They maintain an information service. Their man-

agers are on the job all the time. They can get the crop and market reports directly from headquarters by telegraph and can act upon the information they contain as quickly as other business men engaged in buying and selling farm products. When they act they do so as agents for large groups of farmers. The officials and business managers of farmers' organizations can do with the crop and market reports what neither the Department of Agriculture nor other public agencies can do, namely, interpret the reports in terms of immediate action and give specific advice to the membership as to increasing or decreasing production and whether to rush their products to market or withhold them, and they can make other adjustments indicated by current market conditions. Through cooperative organization and the employment of business managers the individual farmer can utilize the information contained in the crop and market reports practically to the same extent, in much the same way, and just as effectively as individual business men or business organizations.

The key to the successful use of crop and market reports is in their proper analysis and interpretation through comparisons to show the bearing of the essential facts disclosed by them on relative supply, relative demand, and relative prices for a given locality, the State, the United States, or the world, past, present, and future. In studying the crop and market reports a farmer or a farmer's representative should therefore note the past records of production, commercial movement, consumption, stocks, surpluses and deficits, prices, and whether the current reports indicate more or less of these factors in comparison with the reports for the same date or period last year or the average for several years, and from these comparisons and a study of trends, he should try to forecast the probable relative supply, relative demand, and relative prices for the future. Of course, other factors influencing the effective supply, effective demand and prices must also be taken into consideration, such as transportation, the supply of capital for financing crop movement and marketing, interest, discount and exchange rates, industrial activity or idleness, business prosperity or depression, relative purchasing power of consumers, strikes, lockouts, embargoes, tariffs, war and rumors of war, and the like. But after all,

and in spite of the complex problems involved in any attempt to forecast supply, demand, and prices as a basis for action, the individual farmer or farmer's representative can use the crop reports as a practical guide by simply noting carefully whether they indicate more or less than last year or than the average. If more, prices are not likely to advance and may not be maintained. If less, prices are likely to advance or at least to be maintained. This simple working rule applies generally to local, State, national, and world conditions and is the one that farmers can best use as individuals. Crop and market reports can be used to the best advantage, however, by experienced business managers and officials of farmers' organizations.

The American Farm Economic Association State Representatives for 1923

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Arkansas	H. P. McNair, College of Agri., Fayetteville, Ark.
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APPLICATION OF THE LAW OF DIMINISHING RETURNS TO SOME FERTILIZER AND FEED DATA

W. J. SPILLMAN

In August, 1921, while studying the results of some fertilizer experiments at one of the experimental farms (Edgecombe Farm) of the North Carolina Department of Agriculture, it occurred to me that the successive increments in yield due to successive equal increments in fertilizer tend to form the terms of a decreasing geometric series. That is, if the increment in yield due to the second unit of fertilizer is, say, 70 per cent of that due to the first unit, then the increment due to the third unit tends to be 70 per cent of that due to the second, the increment due to the fourth unit tends to be 70 per cent of that due to the third, and so on until the quantity of fertilizer used becomes so large as to be injurious to the crop. Beyond this point the law would, of course, not hold, for the injurious effect of excessive fertilizer introduces a new factor.

ILLUSTRATING LAW OF DIMINISHING INCREASEMENT IN YIELD

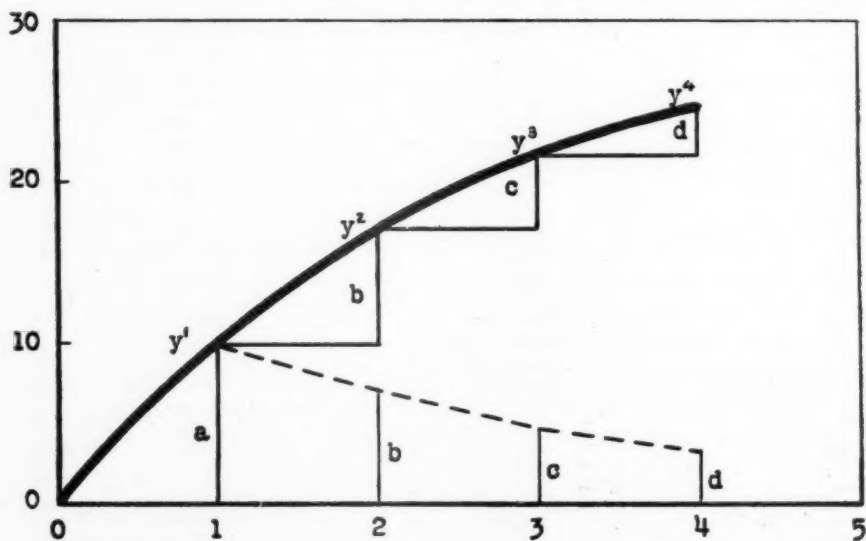


Figure 1 will make the matter clearer. In this figure

y_1 represents the increase in yield when one unit of fertilizer per acre is applied; y_2 the increase when two units are applied; y_3 the increase for three units and so on.

Since a single unit produces the increase y_1 , and two units produce the increase y_2 , it follows that the second of the two units produces an increase of only $y_2 - y_1$, which is the line b in the figure. Similarly, the line c is the increase due to a third unit, d that due to a fourth unit, and so on. To preserve symmetry of notation, let us use a instead of y_1 for the increase due to the first unit of fertilizer. Then a, b, c, d, etc., tend to form the terms of a geometric series, the ratio of b to a being the same as the ratio of c to b, d to c, etc. Thus, if b is 70 per cent of a, then c tends to be 70 per cent of b, d 70 per cent of c, etc.

The upper curve in the figure represents the increments in yield due to 1, 2, 3, 4, etc., units of fertilizer; the lower (broken) curve the increments due to the first, second, third, etc., units. The equation of the upper curve is the ordinary formula for the sum of a decreasing geometric series (see below); that of the lower curve is the formula for the nth term of such a series.

Table 1.—Effect of increasing amounts of fertilizer on the yield of cotton. Edgecombe Farm (N. C.) Experiment Station.

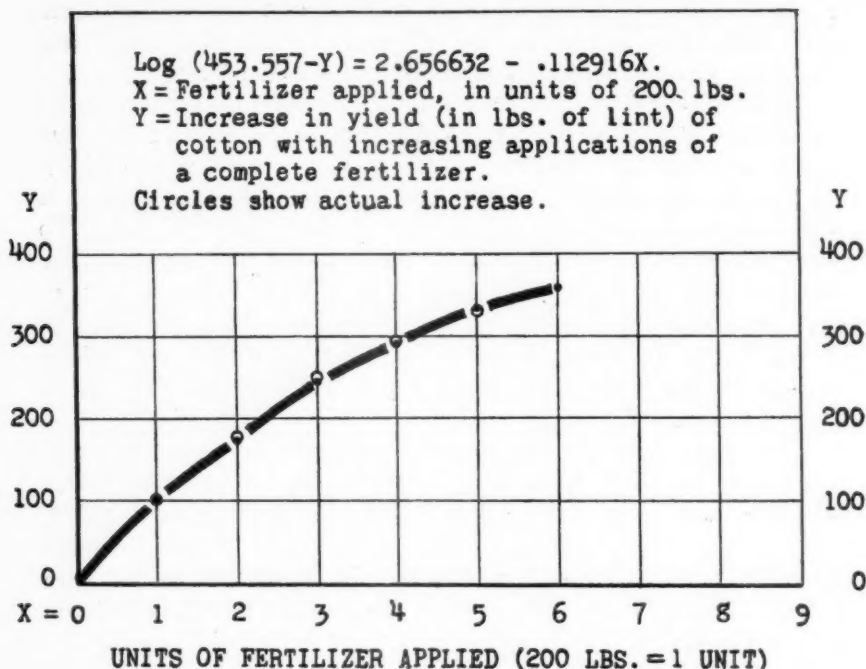
Units of* fert. No.	Yield per acre lbs.	Incr. per unit lbs.	Calcu- lated incr. lbs.	Calcu- lated yield lbs.	Dif- fer- ence lbs.
0	134.7	----	----	134.7	----
1	237.2	102.5	103.9	238.6	1.4
2	322.2	85.0	80.0	318.6	-3.6
3	384.7	62.5	61.8	380.4	-4.3
4	429.7	45.0	49.4	429.8	.1
5	462.2	32.5	34.9	464.7	2.5

*A unit being 200 lbs. of fertilizer.

Table 1 further illustrates the principles involved. The third column of this table shows the increase in yield for each additional unit of fertilizer. Each increase is smaller than the one preceding it (except the first, of course). These numbers are here assumed to tend to form a geometric series.

The numbers in the fourth column are the terms of the geometric series that gives the best agreement between the theory and the observed facts. The next column shows

YIELD INCREASE DUE TO FERTILIZER ON COTTON



the yields calculated from the yield on the first plat and the numbers in the fourth column. Thus, the second number in the fifth column is 134.7 plus 103.9; the next number is the sum of 238.6 plus 80.0; and so on. The last column shows the difference between the observed and the calculated yields. The greatest of these differences is less than 2 per cent of the corresponding observed yield.

Table 2.—Relation of yield of cotton to amount of fertilizer used per acre on farms in Sumter County, Georgia.

Fertilizer per acre		No. of farms	Observed yields lbs.	Calcu- lated yields lbs.	Dif- fer- ence lbs.
Limits lbs.	Aver. lbs.				
-200	171	37	228	226.0	-2.0
201-300	257	78	258	256.2	-1.8
301-400	350	69	285	285.0	0.
401-500	443	43	314	310.2	-3.8
501 plus	620	41	339	346.5	7.5

Table 2 shows the observed and calculated yields for the farms included in a farm management survey in Georgia. The

farms were divided into groups according to the amount of fertilizer used per acre, and the average yield of lint cotton was determined for each of these groups. Here again the calculated yields differ from the observed yields by less than 2 per cent except for the last group, where the difference is slightly more than 2 per cent. In this case the fertilizers used on the different farms were not always of the same character, and rather wide variations from theory are therefore to be expected.

Table 3.—Potash on cabbage.

Per cent of potash in fert.	Yield of cabbage per acre tons	Calculated yield tons	Difference tons
0	3.11	3.11	0.
1	5.21	4.87	-.34
3	6.57	6.70	.13
5	7.40	7.44	.04
8	7.91	7.81	-.10

Table 3 gives corresponding figures for the results of experiments in which the amount of potash in the fertilizer used on cabbages varied. The experiments were conducted by Dr. J. Peterson, in Florida. The plats all received the same amounts of phosphoric acid and nitrogen. Here also only one of the calculated yields differs from the corresponding observed yield by more than 2 per cent. This one result is 7 per cent too low. But this can hardly vitiate the theory when we consider the well known variability of results in field experiments.

Table 4.—Decreasing returns from irrigation water.

Inches of water per acre	Yield per acre* bu.	Calculated yields bu.	Difference bu.
6	132	132.0	0.
12	199	199.7	.7
18	245	243.0	-2.0
24	270	270.7	.7
30	289	288.5	-.5
36	299	299.9	.8

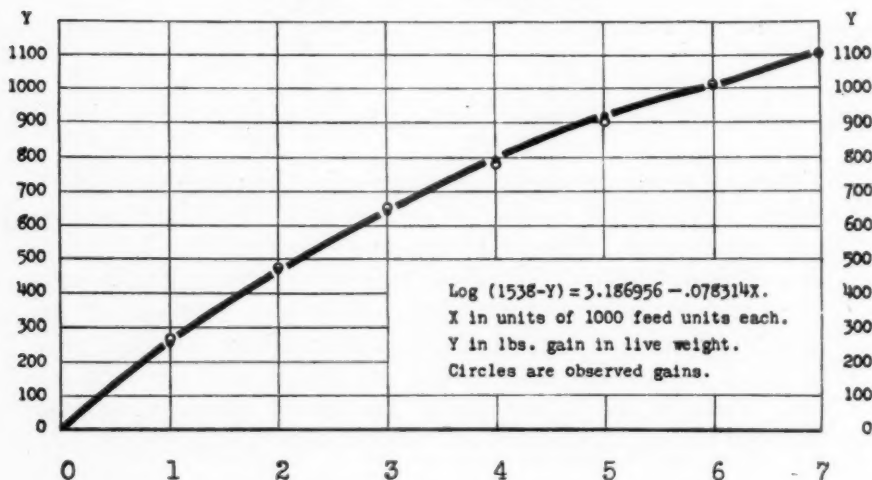
*Potatoes.

Table 4 gives similar results for the decreasing returns from irrigation water applied to potatoes in Idaho. The experiments were conducted cooperatively by the U. S. Department of Agriculture, and the Idaho State Land Board, and were reported

in Department Bulletin No. 339. The differences between observed and calculated results are less than 1 per cent. Generally speaking, irrigation experiments do not give such regular results because of differences in the amount of seepage on the different plats. The observed yields in Table 4 are averages for a large number of experiments, which accounts for their close conformity to the law.

It is well known that animals on feed make smaller and smaller gains per thousand feed units as the animals increase in weight. The assumption that the successive increments in

RELATION OF INCREASE IN WEIGHT OF STEERS
TO FEED UNITS CONSUMED



weight from the consumption of successive equal quantities of feed tend to constitute the terms of a decreasing geometric series also gives calculated weights agreeing very well with observed weights. The classic work of Professor Haecker at the Minnesota Experiment Station, on the feeding of steers, provides excellent material for testing this hypothesis. The results of the test are shown in Table 5, and also in figure 3. The feed consumed by the steers (from birth) was converted into feed units, a unit being a pound of corn or its equivalent in nutritive value, and the gains made by the steers for each thousand feed units were then calculated from Professor Haecker's published data (See Minnesota Bulletin No. 193).

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RETURNS TO SOME FERTILIZER AND FEED DATA.

Table 5.—Decreasing returns from feed with steers

Feed units	Gains		Differ- ences lbs.
	Observed lbs.	Calc. lbs.	
1,000	260	258	-2
2,000	470	471	1
3,000	650	646	-4
4,000	782	791	9
5,000	903	911	8
6,000	1,009	1,009	0
7,000	1,102	1,091	-11

The resulting gains are shown in column two of the table. The gains calculated on the assumption of the geometric series for the successive increments in weight for successive equal increase in feed consumed are given in the third column. The errors in the calculated results are shown in the last column. The variation of calculated from observed weights is only slightly more than 1 per cent at any time during the growth of these animals. This is not only strong evidence for the validity of the theory, but is also an indication of the great precision with which the experiments were conducted.

Table 6.—Decreasing returns from feed with hogs.

Feed units	Gains		Differ- ences lbs.
	Observed lbs.	Calc. lbs.	
200	67.0	61.8	-5.2
400	120.0	117.4	-2.6
600	167.5	167.5	0.
800	207.5	212.6	5.1
1,000	251.5	253.1	1.6
1,200	290.5	289.6	-.9
1,400	327.5	322.6	-4.9

In Henry and Morrison's Feeds and Feeding is given a summary of the experimental work on the fattening of hogs. From this summary the second column of Table 6 was calculated, the figures in this column being taken as the observed gains made by the hogs. The gains calculated on the assumption of the geometric series are given in the third column, and the differences between these and the observed weights in the last column. The agreement of theory with observed gains is not so close here, there being a variation of about 8 per cent in the first calculated gain. These data are not homogeneous, since they do not represent the same animals throughout. Many of the experiments included in the summary began with hogs weighing more than 67 pounds, and others stopped

before the hogs had reached a weight of 300 pounds. The middle part of the table does represent fairly homogeneous data, and here the agreement is satisfactory.

To assist the reader in visualizing the results, figures 2 and 3 have been inserted. Figure 2 relates to the fertilizer experiments on which Table 1 is based; figure 3 visualizes Professor Haecker's steer feeding results. In both figures the circles represent the observed and the curve the calculated results.

Law of the Diminishing Increment

To obtain a mathematical expression for the law which is assumed above, we merely take the formula for the sum of a decreasing geometric series, which is—

$$S = \frac{a}{1-R} (1-R^n),$$

in which S is the sum of the series to n terms, a the first term, R the ratio of any term (after the first) to the preceding term, and n the number of terms. Since R is by hypothesis less than unity, R^n decreases as n increases, and becomes indefinitely small when n becomes indefinitely large. Hence as n increases, the value of S approaches more and more nearly to the value

$\frac{a}{1-R}$. This later expression is thus the maximum toward

which the value of S approaches as n increases indefinitely. Since in any particular problem a and R are constants, the ex-

pression $\frac{a}{1-R}$ is constant. For convenience, let A represent

this expression. In order to introduce the more usual algebraic terminology, let us substitute y for S and x for n . Making these

substitutions, and substituting A for $\frac{a}{1-R}$, the above formula becomes

$$y = A(1-R^x). \quad (1)$$

Here y represents the increase in yield due to x units of fertilizer, or the increase in weight from the consumption of x units of feed (with animals on full feed), the unit in each case being any arbitrary quantity assumed as a unit, and A

represents the total increase in yield obtainable from the use of a given fertilizer, or the total gain an animal can make on a given feed.

Equation (1) above, assuming that it represents the actual law governing increase in yield or weight, may be called the law of diminishing increment in yield or weight. This equation can be put in a form more convenient for use. Let M represent the maximum yield (not merely increase in yield) obtainable with any quantity of a given fertilizer on a given crop, under given conditions. Let Y represent the yield corresponding to x units of fertilizer, and y_0 the yield without fertilizer. Then

$$y = Y - y_0, \text{ and } A = M - y_0.$$

Substituting these values in (1), and reducing, we obtain

$$Y = M - (M - y_0) R^x. \quad (2)$$

Here Y represents the actual yield when x units of fertilizer are used, not merely the gain in yield due to fertilizer. M likewise represents the maximum toward which the value of Y approaches, not merely the maximum increase in yield.

Diminishing Net Returns per Acre

The law of diminishing profits, or net returns, per acre can be deducted from the results obtained above. To do this, let p represent the profit from an acre of some crop, say cotton. Let V represent the value of a unit of the product less the cost of harvesting, ginning, and marketing the unit; that is, less that part of the cost of a unit that is proportional to yield. Let K represent the cost of a unit of fertilizer, and C the other costs of bringing an acre of the crop up to harvest time. As before, Y will represent the yield when x units of fertilizer are used per acre. The profit per acre is expressed by the formula—

$$p = VY - Kx - C. \quad (3)$$

This equation is the mathematical expression of the law of diminishing returns per acre. The value of x which gives p its maximum value, that is, the application of fertilizer which

gives the greatest net returns per acre, is found by differentiating p with respect to x , placing the resulting derivative equal to zero, and solving for x . To make this differentiation possible, we must substitute for Y its value in terms of x (see equation (2)). This gives—

$$P = V(M - (M - y_0)R^x) - Kx - C, \\ = VM - V(M - y_0)R^x - Kx - C.$$

Now, differentiating the second member of this equation with respect to x , and placing the resultant derivative equal to zero, we obtain

$$-V(M - y_0) \frac{R^x \log R}{m} - K = 0,$$

in which m is .434294, or the modulus of the common system of logarithms. Solving for R^x we have

$$R^x = \frac{m}{(M - y_0)(-\log R)} \cdot \frac{K}{V}.$$

As a matter of convenience, let L represent the first fraction in the second member of this last equation. Making this substitution, taking the logarithm of both members, and then dividing through by $\log R$, we have

$$x = \frac{\log L + \log K - \log V}{\log R}. \quad (4)$$

The value of x found from equation (4) is the one that gives p its maximum value; in other words, it is the number of units of fertilizer that gives the greatest profit per acre from the crop.

In the case of the North Carolina experiments with fertilizer on cotton, the closest agreement between theory and actual experimental results is obtained by assuming a to be 103.9, and R to be .77105. (The method of finding these values of

A and R is discussed later.) Since $A = \frac{a}{1-R}$, this gives

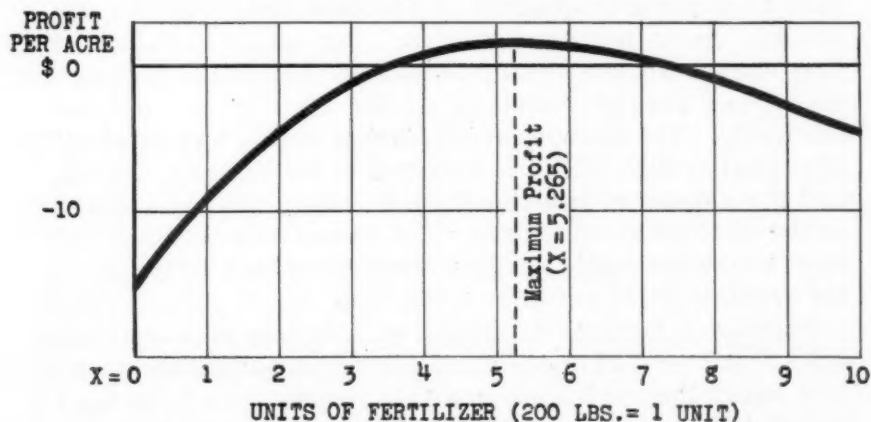
$A=453.6$. And since M is A plus the yield with no fertilizer, which is 134.7, $M = 588.3$, which is the maximum toward which the yield approaches as the amount of fertilizer used increases. Attention has already been called to the fact that this law can not continue to operate when the amount of fertilizer used becomes large enough to injure the crop.

If we assume that V , the value of a pound of cotton less cost of packing, ginning, and marketing, is 10 cents, that the cost of a unit of fertilizer (applied) is \$3 (for 200 pounds), and that C , the cost (other than for fertilizer) of bringing an acre of cotton up to picking time, is \$30, then equation (3) above becomes for this case—

$$P = .10Y - 3x - 30 \quad (5)$$

for the profit on one acre. Calculating the values of Y corresponding to different values of x by means of equation (2), and the corresponding values of p from equation (5), we have the results shown in Table 7. The value of x which gives p its maximum value, that is, the number of fertilizer units giving the greatest profit from an acre of the crop, is seen to lie a little above 5 units (1,000 lbs.). These results are visualized in figure 4.

LAW OF DIMINISHING NET RETURNS PER ACRE



The exact value of x giving the maximum value of p , calculated from equation (4), is 5.265 units, or 1,053 pounds of fer-

tilizer, which is slightly more than the greatest quantity used in the experiments. Assuming that the proposed law is valid, we see here that a few experimental plats will furnish data for determining the most probable values of a and R , and thus calculating the results to be obtained from any quantity of fertilizer, within the limit of injurious quantities. But the treatment given the plats must be identical except as to quantity of the kind of fertilizer under test.

Table 7.—Profit per acre of cotton for various amounts of fertilizer.

Fert. units per a.	Corre- sponding yields (lbs.)	Profit per acre
0	134.7	-\$16.58
1	238.6	- 9.14
2	318.6	- 4.14
3	380.4	- .96
4	429.8	.98
5	464.7	1.47
6	493.0	1.30
7	514.8	.48
8	531.6	- .84
9	544.6	- 2.54
10	554.6	- 4.54

Diminishing Returns on Capital

Where the amount of land available for a crop is limited, and the amount of capital required to purchase fertilizers is not limited, then area of land is the limiting factor, and it pays to apply that quantity of fertilizer that will give the greatest profit per acre of crop. But such conditions, if they exist at all, are usually temporary; if one has the capital he can usually command all the land he can operate efficiently. The more usual case is that in which the amount of capital available for the purchase of fertilizers is limited, and the amount of land for the crop may be made as large as the circumstances require. Let us see if in this case the most profitable application of fertilizer is that which gives the greatest profit per acre of the crop.

Suppose a farmer has capital sufficient to purchase 100 units (each of 200 pounds) of the fertilizer known to be best under the conditions, and that he can get all the land he needs in order to secure the maximum profit from the crop to which the fertilizer is applied. To how many acres should he apply the 100 units?

The answer to this question can also be found from the principles developed in the foregoing discussion. For this purpose let n represent the number of acres to which the fertilizer is to be applied, p the profit per acre, and P the total profit from the entire acreage of the crop. Then

$$P = np.$$

Substituting for p in this equation its value from equation (3), we have

$$P = n(VY - Kx - C), \quad (6)$$

in which the symbols V , Y , K , x , and C , have the same meaning as in equation (3). Equation (6) gives us a mathematical expression for the law of diminishing returns on capital. To find the maximum value of P , we differentiate P with respect to n , place the resulting derivative equal to zero, and solve for n . The answer is the number of acres to which the 100 units of fertilizer should be applied in order to produce the greatest profit from the entire acreage. In order to accomplish this differentiation, we must first substitute for Y its value from equation (2), and then substitute for x its value in terms of n . This value of x is determined as follows: Let F represent the number of units of fertilizer available, which is supposed to be a fixed quantity. Then

$$\begin{aligned} F &= nx, \\ x &= F/n. \end{aligned} \quad (7)$$

from which

Making these substitutions, and reducing, we obtain

$$P = nVM - nV(M - y_0)R^{F/n} - FK - nC.$$

Now, differentiating P with respect to n , and placing the resulting derivative equal to zero, we have

$$VM - V(M - y_0)R^{F/n} + V(M - y_0)\frac{R^{F/n}F \log R}{nm} - C = 0,$$

in which m is .434294, or the modulus of the common system of logarithms, and the other symbols have the same meaning as before. The solution of this equation will be much simpler if we substitute for n its value in terms of x , which, from equation (7), is seen to be F/x . Making this substitution, and reducing, we have

$$R^x \left(1 + \frac{-\log R}{m} x \right) = \frac{M - C/V}{M - y_0}. \quad (8)$$

No general solution can be given for this equation, but when the value of its constants are known, as they would be in any specific problem, the value of x can be found to any desired degree of accuracy by the method of approximation (cut and try method). When x is known, n is easily calculated from equation (7). The value of n thus found will be the number of acres to which the application of the F units of fertilizer will give the greatest profit.

Let us apply equation (6) and (8) to the case of the North Carolina experiments. Suppose a cotton grower under the conditions of this experiment has capital enough to buy 100 200-pound units of the fertilizer known to be best under these conditions. To what acreage of cotton should this quantity of fertilizer be applied in order to obtain the greatest profit from the entire crop?

Here we have—

$$R = .77105; m = .4343; M = 588.3; C = 30; V = .10; \\ \text{and } y_0 = 134.7.$$

The value of x obtained from equation (8) on the basis of these values is 4.902; i. e., the most profitable rate of application in this case is 4.902 units, or 980.4 pounds per acre, which it is to be observed is less than the application producing the greatest profit per acre. At this rate the 100 units will cover 20.4 acres.

To visualize this result, let us calculate the value of P for a series of values of n . Assuming n successively equal to 10, 20, 30 and 40 acres, the corresponding values of x are 10, 5, $3 \frac{1}{3}$ and $2 \frac{1}{2}$. From these values of x we obtain from equation (2) the corresponding values of Y , which

are 554.54, 464.61, 397.56 and 351.43. Substituting these values successively in (6), we find for P the series of values given in the last column of Table 8. The maximum profit is seen to occur when the acreage is slightly in excess of 20 acres. We have already seen that it occurs when the area to which the hundred units are applied is 20.4 acres.

These results are visualized in Figure 5.

**PROFIT FROM A VARIABLE ACREAGE OF COTTON TO WHICH
A GIVEN QUANTITY OF FERTILIZER IS APPLIED**

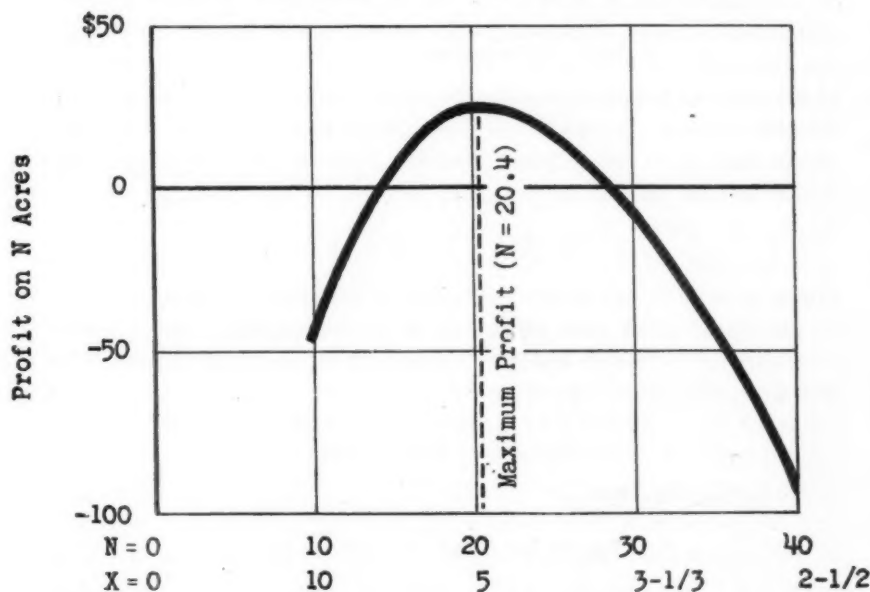


Table 8.—Relation of profit and acreage to which a fixed quantity of fertilizer is applied

Acres to which applied	Units applied per acre	Profit from the crop
10	10	-\$45.460
20	5	29.220
30	3 1/3	- 7.323
40	2 1/2	- 94.276

We see from the above that the law of diminishing returns is not a simple thing; it has more than one mathematical expression, according to the nature of the factor

which is the limiting factor in the case. Thus, it has one form when the amount of land available is limited, another when capital is the limiting factor. We must also distinguish the law of diminishing net returns, in all its forms, from the law of diminishing increment in yield of a crop, weight of an animal, etc.

Several years ago the German experimenter Mitscherlich discovered that the rate at which yield of a crop increases as the amount of a given fertilizer applied increases is proportional to the increase in yield yet possible from the use of the fertilizer in question. To express this relation mathematically, let dy represent the rate at which yield increases, dx the rate at which the fertilizer application increases, A the total increase in yield obtainable by the use of the fertilizer, and y the increase due to x units of the fertilizer per acre. Also let k represent the factor of proportionality. Then we have—

$$dy/dx = k (A - y).$$

Here $A - y$ is the total increase in yield yet possible.

Integration of this equation is accomplished as follows:

Dividing through by $A - y$, and multiplying through by dx , we obtain

$$dy / (A - y) = k dx.$$

Integrating, we have

$$\text{Log } (A - y) = -kx + C.$$

Since, by hypothesis, y equals zero when x equals zero, when x becomes zero this last equation becomes

$$\text{Log } A = C.$$

Substituting this value for C in the previous equation, and transposing, we have

$$\text{Log } (A - y) - \text{log } A = -kx, \text{ whence } \text{Log } \frac{A - y}{A} = -kx.$$

Passing from logarithms to numbers, we obtain

$$(A - y) / A = e^{-kx}, \text{ from which } y = A (1 - e^{-kx}) \quad (9)$$

This equation is identical with our equation (1) except that here we have e^{-k} instead of R . It can easily be shown that Mitscherlich's e^{-k} and my R are identical, so that Mitscherlich's results are in agreement with those presented above. When more than one limiting factor of growth varies, this equation assumes a more complex form than that here given, but space will not permit full discussion of this phase of the question here. A very full and clear presentation of Mitscherlich's results is given by Dr. Emil Lang in the *Landwirtschaftliche Jahrbücker*, Vol. LV.

Methods of Evaluating a and R

When experimental results are available for obtaining the values of the constants a (first term of the geometric series giving closest agreement between theory and observation) and R (ratio of the series), either of two general methods may be pursued. These constants may be evaluated by Pearson's method of moments, or by the method of approximation. In the use of the latter method it will be helpful to remember that changing the value of a merely revolves the curve of growth (Figures 2 and 3) about the origin, having very little effect on the amount of curvature in the line of growth. Changing the value of R has the effect of changing the degree of curvature of the curve, but has little effect in revolving the curve about the origin.

A first approximation to the value of R may be obtained as follows: First plot the observed yields on a system of rectangular coordinates and draw as smooth a curve through them as possible. From this curve the values of y corresponding to the values 1, 2, 3, 4, etc., of x are obtained. Then divide y_4 by y_3 , y_3 by y_2 , and y_2 by y_1 . The average of the quotients from these divisions will be a first approximation to the value of R . The value of y_1 is itself a first approximation to the value of a . Starting from these values of a and R , it is not difficult to calculate series of values for the increments of yield which form the terms of the series, and from them to obtain the values of y . Then if the curve lies too far below or above the observed values of y , increase or decrease the value of a ; if the curvature of the curve is too great, increase the value of R ; if too slight, decrease

the value of R . In this way a good fit will soon be found. In view of the fact that the results of field experiments with fertilizers are themselves only approximate, the fit obtained by this method of approximation will serve all practical purposes. Pearson's method of moments is at present available only to trained mathematicians. By preparing tables of values for two very complex mathematical expressions, the method of moments can be made available to any one who can use logarithms. These tables are now being prepared. Those who may desire to make use of Pearson's method of moments will find a good account of it in *Biometrika*, Vol. I, pp. 265-303.

American Farm Economic Association Membership by States, December 23, 1922

District of Columbia	112	North Dakota	6
Illinois	71	South Dakota	6
Wisconsin	42	Utah	6
Iowa	41	Oregon	5
New York	40	Delaware	4
Pennsylvania	23	North Carolina	4
Ohio	21	W. Virginia	4
Indiana	21	Arizona	3
California	19	Louisiana	3
Minnesota	19	Mississippi	3
Massachusetts	17	New Hampshire	3
Virginia	16	South Carolina	3
Michigan	15	Arkansas	2
Colorado	13	Idaho	2
Kansas	11	New Mexico	2
Kentucky	11	Wyoming	2
Missouri	11	Alabama	1
Texas	11	Florida	1
Tennessee	10	Oklahoma	1
Maryland	9	Philippine Islands	1
Montana	9	Rhode Island	1
Nebraska	9	Vermont	1
Washington	9	Foreign Countries	27
Connecticut	8		
New Jersey	7		
Georgia	6		
			672

THIRTEENTH ANNUAL MEETING AMERICAN FARM ECONOMIC ASSOCIATION

Chicago, December 28, 29, 30, 1922

December 28, 9:30 A. M.

Meeting called to order by President B. H. Hibbard. The reports of the committees on Teaching and on Extension were read, discussed and accepted. A nominating committee composed of G. F. Warren, O. B. Jessness and W. E. Grimes was announced by the chairman. An auditing committee composed of Mr. R. H. Wilcox and Mr. J. A. Horner was appointed. The business meeting was then adjourned.

The program was carried out as printed with the exception that Mr. Clyde King was not present and his paper was not read.

December 30, 9:00 A. M.

Meeting called to order by President Hibbard. The report of the Secretary and Treasurer was read and adopted. The report of the committee on Terminology was read and it was voted that the recommendations made by the committee be printed in the Journal. The report of the committee on Investigation was read and adopted. The report of the committee on Nomination of Officers for the ensuing year was read. As there were no further nominations it was voted that the chairman of the nominating committee cast the vote of the Association for the persons nominated. The following officers were elected: T. P. Cooper, president; H. E. Erdman, vice president; J. I. Falconer, secretary-treasurer.

A memorial to W. F. Handschin, past president, was read and ordered printed in the Journal, a copy to be sent to Mrs. Handschin. The meeting was then adjourned.

Approximate attendance at meetings:

Thursday a. m.-----	50	Friday evening-----	300
Thursday p. m.-----	90	Saturday (business)---	45
Friday a. m.-----	500	Saturday (program)---	300
Friday p. m.-----	175		

At the luncheon held at the City Club Saturday noon there were 88 present.

Financial Statement American Farm Economic Association December 23, 1922

Receipts

Cash on hand, January 1, 1922-----	\$167.81
Receipts for the year-----	1,363.17
Total to be accounted for-----	<u>\$1,530.98</u>

Expenses

Printing Journal, 4 issues-----	\$883.81
Stamps-----	80.42
Stationery, Programs and Printing-----	60.25
Organization Expense, Washington Chapter-----	37.45
Flowers, W. F. Handschin-----	10.00
Expenses of Pittsburgh Meeting-----	14.62
C. L. Stewart Committee Expense-----	5.00
Telegrams-----	1.50
Rebate on order-----	1.00
Total-----	<u>\$1,094.05</u>
Balance in bank—Fifth Avenue Savings Bank-----	254.38
Certificate of deposit—Park Building and Loan Co.-----	50.00
Note—F. L. Morison-----	175.00
	<u>\$1,573.43</u>
Uncashed checks No. 41 and No. 50-----	42.45
	<u>\$1,530.98</u>
Net Balance on hand, December 23, 1922 (not including life membership fund)-----	\$174.63
Net Balance on hand, December 24, 1921-----	2.81
Net Gain for the Year-----	<u>\$171.82</u>
Life Membership Fund-----	\$40.00

Membership.

On December 24, 1921, there were 569 paid up memberships on the books of the Association. During the year 143 members were dropped for the non-payment of dues, while 246 new members were added, making a net gain of 103 members for the year. There were 675 members on December 23, 1922. The District of Columbia with 112 members now leads. Illinois has 71 members, Wisconsin has 42, Iowa 41 and New York 40.

The Journal.

Four numbers of the Journal were published in 1922 having a total of 248 pages. This was fifty pages more

than the year 1921. Beginning with the October issue the Journal was printed by the National Publishing Company, of Washington, D. C., instead of by the New Era Company. A change deemed desirable because of the slowness with which the New Era Company got out the issues.

Members Present at Chicago Meeting, December, 1922

Arnold, C. R.	Gray, L. C.	Rauchensten, E.
Ault, O. C.	Green, R. M.	Rhoades, E. L.
Beardsley, H. L.	Grimes, W. E.	Riddell, F. T.
Becker, J. A.	Gromer, S. D.	Robertson, L.
Benedict, M. R.	Gruber, G.	Robotha, F.
Benner, C. L.	Hammans, C. W.	Rogers, R. H.
Bilsborrow, J. D.	Hibbard, B. H.	Ross, H. A.
Black, J. D.	Holmes, G. L.	Roth, W. J.
Baker, O. E.	Hopkins, J. A.	Schrider, G. W.
Borden, W. H.	Horner, J. T.	Schurz, F. D.
Boss, A.	Haverstick, A. T.	Seoville, H. T.
Brand, Charles	Howe, F. W.	Snyder, C. E.
Bressler, R. G.	Hutson, J. B.	Sollenberger, I. J.
Brown, P. H.	Irwin, H. S.	Steanson, O.
Cady, E. L.	Jesness, O. B.	Taber, R. F.
Cance, H. E.	Jett, C. U.	Taylor, H. C.
Card, D. G.	Koisch, Wm.	Tenny, L. S.
Carver, T. N.	Leitch, A.	Thompson, S. H.
Case, H. C. M.	Lescossier, D. D.	Tolley, H. R.
Cooper, T. P.	Lloyd, O. G.	Towne, E. T.
Cox, H. B.	Leickham, C. F.	Trank, J. B.
Crickman, C. W.	McCord, J. E.	Uber, J. E.
Cross, R. W.	McNair, D. D.	Valgren, V. N.
Dixon, H. M.	Mendum, S. W.	Vaughn, F. L.
Daugherty, M. W.	Mighell, A.	Wallace, H. A.
Eaton, H. F.	Miller, C. E.	Waller, A. G.
Eke, P. A.	Nicholls, W. D.	Warren, G. F.
Eliot, H. M.	Nourse, E. G.	Watt, M. W.
Ezekiel, M.	Overton, M. H.	Wehrwein, G. S.
Erdman, H. E.	Peterson, G. A.	Weitz, B. O.
Falconer, J. I.	Pheasant, D. R.	Wilcox, R. H.
Foster, R. G.	Pickell, M. W.	Willard, R. E.
Fraser, W. J.	Pond, G. A.	Working, E. J.
Frederiksen, D. M.	Post, R. E.	Worsham, C. G.
Gacey, L. F.	Price, H. B.	Wright, Ivan
Gallaway, J. C.	Rankin, J. O.	Zarbaugh, G. S. W.
Glasspoole, J. E.		

Total of about 115 including five or six who did not register.

REPORT OF EXTENSION COMMITTEE

Due to the general economic conditions increasing opportunity is afforded the extension workers along economic lines in aiding farmers in obtaining more and better facts to guide them on questions of what to produce, how to organize production and how to market the product.

The extension program in marketing during the past year has given greater emphasis to means and methods of making available facts that should enable farmers to market their products more efficiently. Greater emphasis has been placed upon the importance of grading and standardizing farm products. Increased demand has been experienced for information regarding marketing costs and other facts that will enable a better understanding of the whole business of marketing. Assistance has also been given to local marketing organizations in improving their efficiency through the application and use of the best business methods. The livestock shipping associations are an example of one of the fields from which assistance is in much demand in a number of States.

Practically all the States are devoting some attention to marketing extension. It is realized that farmers have an obligation as well as an interest in the improvement of the efficiency of the marketing mechanism. The demands from farmers for assistance in solving their marketing problems has impressed extension workers with the great need of more facts through investigations. The slow development of this line of work in many States is due to the appreciation of the fact that work in research should be done preliminary to the extension work in marketing.

Farm management extension programs have been carried out during the past year in 35 States through the aid of 46 specialists. In 25 States 34 specialists devote full time to farm management extension work. The work of these men, more commonly known as farm management demonstrators, has been along the line of making available through the State and county extension organizations farm management data that will assist farmers in the solution of their economic problems as well as to supply the background of facts of value in determining the program of

extension work in individual counties or groups of counties.

In order to gain some idea of the development and progress of some phases of this work during the past year a questionnaire containing six questions was sent to the leaders of the work in the different States. A synopsis giving the more outstanding points in the replies to each of these questions from 21 States follows:

Question No. 1. What is the relation between the farm management investigational department and the extension department in your State?

Eight States replying to this question stated there was no investigational division in farm management in the College. In the other 13 States there was reported close working arrangement between the research and extension staff. Several States have regular staff conferences to keep each line of workers familiar with the problems and activities of the other workers.

Question No. 2. What suggestions have you to offer to research workers (State, Federal, or both) pertaining either to projects under way or the ways and means of presenting results to make their work of greatest help to you and the county agents of your State?

Replies to this question included the following suggestions:

- (1) Increase the preparation and publication of popular, well-illustrated bulletins.

- (2) Make more general use of condensed readable tables, simple graphs and charts.

- (3) Issue preliminary reports in mimeographed form.

- (4) Increase the number of projects on cost of producing crops and livestock with the issue of timely reports of a short and practical nature.

- (5) Increase the number of studies dealing with different phases of farm organization.

- (6) Increase the research work on practical tenancy problems.

- (7) More emphasis should be placed upon the importance of getting material to the public more rapidly.

(8) Keep material free from bulky tables and write results in a popular style, at the same time adhering strictly to the facts.

(9) Extension workers could assist investigational staff to present material in more popular style.

(10) Investigations dealing with minor enterprises are relatively of little value in extension work.

(11) Research results too often shoot over the heads of farmers and county agents.

(12) Take up more lines of work that have a practical value, the results of which could be used by county agents in their work with farmers.

Question No. 3. What steps have been taken and what projects are already in operation working toward a long time program in farm management extension in your State?

Practically all States realize the necessity of placing the farm management extension work on a long-time program basis. Several have already taken this advanced step, some having had some phases of the work organized and under way for several years. The farm accounting work has been under way in definite form in several States for a number of years. Several States are making farm business surveys as background information for building a long-time program. Others have made splendid headway through junior extension work.

The progress in farm accounting work has been accomplished through work dealing with the financial record of the business as a whole as well as cost records of individual enterprises.

The preparation and distribution of farm account books, the publication of extension bulletins, the conducting of farm management schools, and tours, as well as definite and systematic means for making available census and other statistical data have all helped pave the way toward working out and putting into operation a long-time program.

The work designed to improve tenant farming is being placed upon a more permanent basis in Iowa, through the establishment in counties of permanent tenancy committees

whose duties will consist of making more extended investigations into tenancy problems, possibly to the extent of establishing accounting work to give specific information on certain phases of the subject.

One State plans to have the farmers cooperating in farm management demonstration work make out an individual farm business improvement program of the steps to be taken by each farmer for the next five years in improving his business.

In Indiana extension surveys are conducted having in mind an analysis that develops and carries out programs of extension work along sound economic lines with the most vital problems stressed first.

Question No. 4. What part has the farm management extension division in your State played?

(A) In helping to determine the program of extension work in individual counties or communities?

Answers to this question included the following suggestions:

(1) By discussions of county programs of work from a farm management standpoint as gained through a background understanding of what has happened and what is happening in the organization of production.

(2) By making special community analysis surveys in which a representative of each division of the Extension Department cooperates.

(B) In influencing the general State plan of extension work in other subject matter divisions?

(1) Through close cooperation of specialists.

(2) Through making available data that will assist all extension specialists in adjusting their program in accordance with the types of agriculture that prevails in different sections of the State.

(3) By assistance to committees which have in charge the apportioning of the various lines of extension work in the different counties.

(4) By recommendations of some approximate systems of farming for various communities that are found economically better than others.

(5) By assisting other subject matter specialists in various phases of work such as putting their accounting methods and interpretations on a more practical cost basis.

(6) Methods of teaching by laboratory work are commanding increased attention and interest of other workers.

(7) By giving all a better understanding of what the business side of farming is like, through the results of farm business analysis surveys, farm account records and cost records.

(8) Through statistical analysis of the agriculture of the State and the preparation of State maps giving graphic presentations.

Question No. 5. What suggestions have you for making farm management more helpful in properly correlating all extension work on a sound economic basis?

(1) Through more careful and thorough means and methods of demonstrating farm management principles and facts.

(2) Through the increased consideration of the subject of the farm as a unit and working cooperatively with other departments to bring about the proper balancing of enterprises.

(3) Through the increased attention of other extension workers to the economic phases of their subject while on the other hand, the farm management demonstrator should keep closely in touch with the production side of the work.

(4) Our work should be so organized and conducted to be of assistance in both determining a definite program and a balanced program.

(5) Develop a method of community analysis in which farmers share responsibility for the success of the project by being made local leaders in helping secure figures and other data so that they better understand the work and have confidence in the results. Also have all division workers of the extension department assist so that each will be better able to realize the importance or unimportance of the various phases of extension work in the area studied.

(6) Prepare maps showing the various types of farming in the State in order that all extension workers may become familiar with the facts that determine the type areas.

Question No. 6. What steps have you taken toward the development of community organizations or clubs in projecting farm management extension work?

- (a) How many local leaders are now actively assisting you and the county agents on various projects?
- (b) How many adult clubs —; adult-junior clubs —; and junior clubs — are in active operation?
- (c) What advantages and difficulties have been experienced in the organization and operation of these community organizations?

One of the later developments in the farm management extension work has been toward the systematizing of the work more on the basis of local community organization. Since practically all extension work has found itself somewhat handicapped until anchored by local organization this seems to be a factor of importance. A few States have made progress in developing community organization and leadership. Maine has 186 project leaders in farm management located in 16 counties, Iowa has 68 adult accounting groups with over 35 local leaders and 35 junior clubs with 20 local leaders. In South Dakota there are 13 adult clubs, 2 adult junior clubs and 2 junior clubs with 19 local leaders. Several other States also have this phase of work developing. There were also given in the replies to this questionnaire some important suggestions regarding the advantages and disadvantages experienced in organizing and conducting local clubs. The full replies to each of these questions are being digested and mimeographed and copies will be available upon application.

H. M. DIXON,
LYNN ROBERTSON,
C. R. ARNOLD,
M. R. BENEDICT,
C. E. LADD.

WALTER F. HANDSCHIN

AN APPRECIATION

Those of us who have been associated with The American Farm Economics Association during the past have missed at this meeting the presence, influence, and cordial fellowship of our former president and co-worker, Walter F. Handschin. We wish, at this time, to offer an appreciation of his sterling worth, of the value of his contribution to the body of agricultural knowledge, and of his splendid example and leadership, not only in the affairs of the Association but in the agricultural industry as a whole.

His environment as a youth on a southern Wisconsin farm, the early foundation laid in high school and collegiate work, and his constant contact with the problems of the farm, gave him a background of knowledge and experience which fitted him peculiarly for the broader field in which he was to engage.

His college course was broken by the necessity of working out his own future, which led him to take his undergraduate work in three State universities—Wisconsin, Minnesota, and Illinois—giving him a wide acquaintance with college men and a clear understanding of, and broad sympathy with, the agricultural industry. This same necessity also kept him actively connected with the social and industrial problems of people on farms. Recognition of the many unsolved problems led him to carry his studies into the graduate school in an attempt to prepare himself adequately to assist in their solution. This breadth of preparation, having a good personality and a genial disposition, gave him unusual qualities of leadership and endeared him to students and associates alike. These qualities also won for him the respect and confidence of farmers.

Because of the briefness of the life period allotted to him and because of the great amount of administrative work and public service crowded upon him, he was unable to bring to full fruition the results of his investigations. The influence he exerted on his students will stand, however, as a monument to his memory. We, the members of this Association, desire at this time to acknowledge our appreciation of his life and work among us and our deep sense of loss in his passing from our midst. We wish also to extend to his wife and family our heartfelt sympathy in their bereavement.

NEWS NOTES

The College of Agriculture of West Virginia, which has been without a regular dean since the resignation of Dean John Lee Coulter in September, 1921, has now at its head Dr. G. R. Lyman, who took up his duties January 1.

Dr. Lyman, a native of Lee Center, Ill., received a bachelor's degree in 1894, got his master's degree in 1899, and in 1906 received his doctor's degree from Harvard. He spent 14 years on the teaching staff of Dartmouth and since 1916 has been with the United States Department of Agriculture, where he held the positions of Pathological Inspector and was in charge of Plant Disease Surveys.

Cooperation was the theme of the November meeting of the District Chapter of the American Farm Economic Association. Lloyd S. Tenny, Assistant Chief of the Bureau of Agricultural Economics, made the chief address, followed by ten-minute discussions by A. M. Loomis of the National Grange and Charles W. Holman, Executive Secretary of the National Milk Producers' Federation. C. M. Morgan, of the American Cotton Growers' Association, and others followed with informal discussion.

"Federal Farm Loans and the Future" was the subject of an address by Judge Charles E. Lobdell, Farm Loan Commissioner, before the December meeting of the District Chapter of the American Farm Economic Association. Judge Lobdell also reviewed the history of the Federal Farm Loan System. V. N. Valgren and A. W. McKay followed Judge Lobdell with ten-minute talks. A. M. Loomis, Charles W. Holman, D. A. Cox, and others entered the general discussion from the floor. Officers for the ensuing year were elected as follows:

C. R. Chambers, Bureau of Agricultural Economics, President; C. D. Bohannon, National School of Commerce, Vice President; Bertha Henderson, Bureau of Agricultural Economics, Secretary and Treasurer.

Leon M. Estabrook, Associate Chief of the Bureau of Agricultural Economics, has been granted a year's furlough

to reorganize the crop reporting system of the Argentine Republic.

"Dues for the year 1923 are now payable. A prompt remittance would be appreciated."—J. I. Falconer.

New Members, July 1—December 31, 1922

- Baker, O. R., 211 Prospect Ave., Madison, Wisconsin.
Bakken, Henry H., 737 Sprague St., Madison, Wisconsin.
Bennett, L. K., Atlantic, Iowa.
Bird, Arthur E., 22 Bedford St., Strand, London, England.
Brand, Charles, Bureau of Agricultural Economics, Washington, D. C.
Carl, Leslie M., Bureau of Agricultural Economics, Des Moines, Iowa.
Carpenter, Paul, Dallas, Oregon.
Chimizu, F., Route No. 4, Box 46, Madison, Wisconsin.
Clark, Emily E., Apt. 413, 1819 G St., N. W., Washington, D. C.
DeVault, Grover G., 901 Regent St., Madison, Wisconsin.
Dickinson, W. A., Charles City, Iowa.
Eaton, H. F., 627 N. Lake St., Madison, Wisconsin.
Elsworth, R. H., 1924 Lawrence St., N. E., Washington, D. C.
Farrell, Geo. E., Bureau of Agricultural Economics, Washington, D. C.
Hayes, A. W., Dept of Sociology, Tulane University, New Orleans, La.
Hesing, E. J., 202 Prospect Ave., Madison, Wisconsin.
James W. L., 1208 Washington Ave., Madison, Wisconsin.
Lindsay, Adrian H., Iowa State College, Ames, Iowa.
Maakestad, W. T. Algona, Iowa.
Macy, C. S., Grundy Center, Iowa.
Mighell, Albert, Iowa State College, Ames, Iowa.
Mizzell, J. L., 419 N. Lake St., Madison, Wisconsin.
McClure, F. D., Dix, Nebraska.
Post, R. E., 817 Harrison Ave., St. Joseph, Michigan.
Reist, H. N., 112 S. Mills St., Madison, Wisconsin.
Renshaw, Guy M., Station A, Ames, Iowa.
Saville, Roscoe J., State College Station, Raleigh, North Carolina.
State Teacher's College, Springfield, Mo.
Thompson, W. S., Miami University Library, Oxford, Ohio.
Vance, Marian C., 712 27th St., N. W., Washington, D. C.
Watt, M. W., Dept. of Agricultural Economics, Madison, Wisconsin.
Wellman, H. R., Agricultural Economics Department, Madison, Wis.
Wertz, V. R., 1320 University Ave., Madison, Wisconsin.
Women's National Farm and Garden Association, 1728 Stevens Bldg., Chicago, Illinois.
Wood, E. G., 1717 University Ave., Madison, Wisconsin.

